ELECTRICAL WORLD

A consolidation of Electrical World, Electrical Engineer and American Electrician

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What in the World!

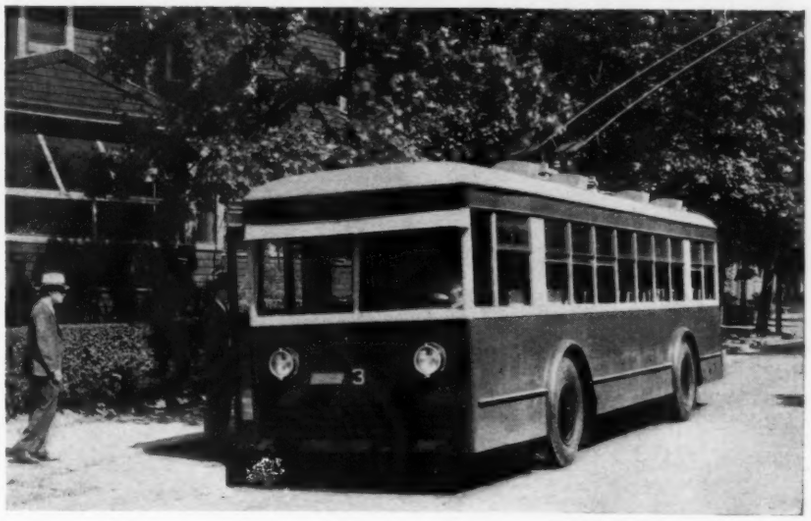
There are as many diagnosticians as doctors for the ailing business world. Each school can shoot the others' case full of holes as fast as their profundities are exposed to public hearing. Analytically, if not equanimically, viewing the disordered scene one who concedes himself to have had a hand in it all states a point. Not the purchasing agent, says he, not the machine, not technological progress, but management acting under the man-made law of "Thou shalt compete" must bear the brunt of guilt. One wonders. Mr. Stevens has a rarely stimulating way of presenting his case (page 609).

●

If you want to get the cold shivers, consider the thesis of "If Roosevelt Were to Fail." For one thing there is the Tennessee Valley phantasmagoria. UNLESS——domestic consumption can be brought to a quadrupled quadrupling of its present magnitude, Unless fertilizer can be absorbed at a rate that no balanced agricultural economy can justify, Unless explosives are required for wholesale volumes of war, Unless some unforeseen and unforeseeable demand for electrochemical processes develops, or, Unless present utility systems are to be destroyed by subsidized competition, the potential outputs of the Tennessee are in excess of any likely demand. Again, one wonders (page 604).

●

There is always a demand for extra copies of the "Electrical World" supplement which appears annually covering the output of the largest electric light and power systems of the country and which accompanied our last week's issue. We have made up some additional copies which may be had as long as the supply lasts— price, one dollar.



Modern electric transportation.

MAY 13, 1933

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May 13, 1933

U. S. Supreme Court Upholds Rate Cuts on Reduced Property Valuations

THOUGH various state commissions have threatened to take cognizance of the lower prices for commodities, supplies and labor in the revision of public utility rates (Illinois is a conspicuous example, ELECTRICAL WORLD, April 22, page 500) it remained for the United States Supreme Court this week to somewhat guardedly but explicitly give its approval to the principle that the reproduction cost element must be flexible. Acting in the appeal of the Los Angeles Gas & Electric Corporation from the 1930 orders of the California Railroad Commission, and the decision of the district court of the southern district of California, regarding the gas rates which might be charged by the utility, the Supreme Court upheld the lower court and the basis of its decision.

1929 cost no measure of value

In passing upon the question of today's values Chief Justice Charles Evans Hughes stated:

"While cost must be considered, the court has held that it is not an exclusive or final test. The public has not underwritten the investment. The property, on any admissible standard of present value, may be worth more or less than it actually cost. The time and circumstances of the outlay and the effect of altered conditions demand consideration."

Chief Justice Hughes than noted that the court had taken cognizance of changed economic conditions both during the inflation prior to 1929 and the subsequent depression.

"It is apparent that the estimates of cost of reproduction of 1929 or 1930," Mr. Hughes added, "afforded no secure foundation for prediction of future values, and the rate base as fixed by the commission is not to be invalidated as involving confiscation by reason of these estimates, which the course of events deprived of credit as trustworthy prophecies."

7 per cent not confiscatory

The court upheld the valuation and computation methods employed by the state commission in placing a value of $65,500,000 on the gas properties of the corporation (which claimed $95,000,000) as fair and held that the effect of the rate reduction (which yielded an estimated return of 7 per cent on a $65,500,000 "fair value" and 7.7 per cent on a $60,704,000 "historical value") to be not "confiscatory."

The decision means refunds for gas consumers of the company of nearly $3,000,000 and an annual saving on future bills of about $1,000,000. Explaining the action of the commission, Chief Justice Hughes declared that what the commission did was to take the historical cost of the plant, calculated on the same basis as to cost of additions and betterments as that used in its several previous rate proceedings, and this amount together with the sums allowed for materials and supplies, and for working capital, with the additional allowance for interest, plus the amount assigned to organization expenses and franchises, and with land at current values, made up the total historical cost. To that total the commission added $4,796,000 in reaching its fair value figure, or rate base, of $65,500,000.

Justice Butler dissents

In a strong dissenting opinion Justice Butler of the Supreme Court has been joined by Justice Sutherland. It is possible that the company may appeal. The dissent asserts: Lack of warrant for the court to reverse the commission and lower court price on which "fair value" had been built up; court should not attempt to ascertain the amount of overheads properly included; no warrant for elimination from agreed inventory or standby plants; failure to appraise "going values"; arbitrary undervaluations established by commission's methods; decree appealed from should be vacated and the case remanded; and district court should refer the case to a special master.

▼

Muscle Shoals Legislation Hastened by Roosevelt

When House and Senate leaders failed to reach an agreement on the Muscle Shoals and Tennessee Valley development bill, President Roosevelt early this week assumed the rôle of referee in an attempt to remove obstructions to speedy enactment. The Chief Executive's views were disclosed at a White House conference attended by Representative McSwain and Senator Norris, who stated that an agreement had been reached on chief sections of the bill and that it would soon be ready for the White House. The House promptly sent the Muscle Shoals plan to conference, after assurances from Chairman McSwain of the military affairs committee that the President desired the step and "has indicated his will on the major provisions of the bill."

▼

New River Intervention Halted

Request of the Radford Iron Company for a review of the ruling of a lower federal court decision refusing to permit it to intervene in the suit brought by the Appalachian Electric Power Company to test the validity of the federal water-power act (ELECTRICAL WORLD, April 8, page 436), has been denied by the U. S. Supreme Court.

Business Must Discipline Itself, Industry Men Tell Commerce Group

AMERICAN business should utilize its trade associations to institute a house-cleaning process which will remove causes for criticism and lead to a broader concept of the proper relationships between industry and the people of the nation, according to prominent electrical industry men who addressed the United States Chamber of Commerce at its meeting in Washington last week. Industry speakers were H. I. Harriman, president of the Chamber of Commerce and chairman of the New England Power Association; J. F. Owens, president Oklahoma Gas & Electric Company, and Gerard Swope, president of the General Electric Company.

Owens would broaden associations

"I have a conviction," said Mr. Owens, "that business is the backbone of a nation. Trade and commerce always has been and always will be the major function of society.

"There are in the United States between 1,500 and 2,000 national trade organizations. The chief executive of each of these trade organizations is a picked man. He must have qualifications that raise him above the average. Would it not be possible for the 1,500 or 2,000 presidents of trade associations to get together on a constructive program whereby business first could clean its own house and not leave this dirty job to the government; not have its dirty linen washed in the view of every citizen? Would it not be possible that through this superorganization or association the broad problems affecting the economic, the social and the industrial advancement of the nation be given study to the end that out of it might come a program?

"Trade associations today, by and large, are doing an excellent job along technical lines. I rather think, however, they may safely leave for a while, as the subject for major consideration, the weight per square inch of textiles, the values of dyes, or the tensile strength of copper, and devote their attention to the value of all values—men—just folks—their relationships with each other; their relationships through business and professional associations, and finally their relationships to government."

Industry must build for future—Swope

"The only security for building permanently for the future is by having industry as a whole build up a strong autonomous self-regulating organization," contended Mr. Swope. "No doubt this will take time to accomplish. It can be done if more of the responsible men in industry will recognize the scope and character of what such trade associations can accomplish and give their time and thought and effort to this end, and appoint to the executive management of such associations men who have had a background of experience and who have ability and can carry on a continuous policy.

"Trade associations face the difficult task, which indeed has always been before them, of finding some basis of agreement, rather than to conclude that the only thing they can agree on is to agree to disagree. Out of this no constructive leadership can arise.

The attitude of the public and all evidences of legislation indicate that if industry can find a basis of agreement within itself, and move in the direction of self-imposed discipline and regulation, an opportunity will be given it to demonstrate how effective and constructive its leadership can be. I have said before, and I repeat, that if industry does not see its opportunity and embrace it, it will be done from without. The alternative, therefore, is not shall it be done, but by whom shall it be done.

Program for industry action

"For industry and commerce to do this, it would seem necessary for each trade association to say that for membership in its particular organization the members shall subscribe, first, to a code of ethics in regard to what constitutes fair competition; second, that they shall adopt a system of uniform cost accounting and uniform periodical reports to their stockholders and to the federal government, in accordance with the latest most approved standards; third, that members of each association shall adopt comprehensive and co-operative plans for the protection of their employees, and the associations will arrange with each other for the transfer of these rights and benefits when employees go from one organization to another; fourth, that each association shall endeavor to stabilize employment as far as possible, by requiring that each member shall either give assurance of employment, or, in the absence of that, build up reserves for periods of unemployment, to be contributed to by employees and employer. Then the association will ask the government for recognition of its organization, that the members may agree on the co-ordina-

Visual Numbers Control Grain Flow

Westinghouse Elec. & Mfg. Co.

Five years without a single faulty operation is the record established by a visual number control system for the handling of grain at the Reading Railroad's Port Richmond, Philadelphia, elevator. An elaborate system of syncro-ties insures that the several dozen belts carrying various kinds and qualities of grain discharge to the proper bins. Operators use position indicators to signal visually to workers in the plant just how the material is to be handled. The weighman here shown has advised the trip operator that the grain is to go to bin 438 and as to which belt it will arrive on. A full check on the local operators may be had at all times by the weighman.

tion of production and consumption, with an opportunity for the government to review the acts and agreements of members of the association.

"Trade associations developed along such lines, under constructive leadership, would be a real force in shaping industry to the service of the public, be in advance of the demands of public opinion, if necessary ask for legislation on recalcitrant minorities and promote consumption on fair and reasonable lines. They could mobilize the strength of their industry in connection with local, state and federal legislation, where today they stand divided and impotent."

Dangers in public works

In discussing the administration's public works program Mr. Harriman stated: "A large public works program calling for the expenditure of from two to five billions of dollars has ardent advocates in Congress. They contend that so large an outlay by the federal government in public works, or in aid to private projects, will sufficiently prime the industrial pump to start the nation back on the road to recovery. I doubt that such a program by itself will accomplish this purpose. A deflation of fifty billion dollars in our annual income cannot be offset solely by a program of public works. Such a program cannot be advocated as a substitute for the opportunity for the different classes of industry themselves to proceed with measures which will bring a widespread increase in purchasing power through better wages and higher prices."

▼

Chairmanship Row Ends in Truce in Pennsylvania

Controversy over the chairmanship of the Pennsylvania Public Service Commission, precipitated by Governor Pinchot when, immediately following the adjournment of the state legislature, he named C. Jay Goodnough as chairman in place of Dr. Clyde L. King, dropping Dr. King from the commission, has terminated temporarily in a truce pending a decision by the state Supreme Court on the claimants. The truce was arranged by Attorney-General Schnader, who is acting for Mr. Goodnough as well as the Governor, and Roland S. Morris, attorney for Dr. King. It was decided that neither claimant would sit with the commission until the case was decided. When the commission met early this week, in Harrisburg, S. Ray Shelby automatically served as chairman by virtue of being the oldest commissioner in point of service. In announcing the case would be taken to the Supreme Court, Mr. Schnader said the agreement had been entered into in order to avoid any interference with the orderly conduct of the work of the commission.

The Sun Shines Brighter Than It Used To

Definite evidences that the pulse of trade has quickened to an amazing degree now exist. Electrical energy production for the first time since 1930 has crossed the line of the preceding year. Doing better than in 1932 is the characteristic of such other dependable telltales as steel output, bond and stock prices, commodity quotations, automobile manufacture and general business barometers. Commodities rose in April by 4¼ per cent, the largest monthly advance in about twelve years. Stock prices have increased on the average by nearly 30 per cent of their last year's quotations.

At the moment there are two influences at work. One, the apparent natural inclination on the part of economic forces to lead to a discernible resumption of activity. The other, the influence of impending application of measures for actual inflation. The latter appears to dominate, for reports from retail distributors show that their sales, while somewhat improved, are not in proportion to the reported volumes of manufacturing increases, goods shipments and sales to dealers. Thus one assumes buying for inventory at low prices, speculative purchases and hoped-for improvement to dominate the situation. This is certainly justified when the assurance comes from the President himself that there will be no stopping short of success in the effort to raise prices and restore trade and that the more desperate measures to revive the country, which was "dying by inches," will be invoked if necessary.

The new deal, it seems, is more than economic or social. It has to do with moral and spiritual matters as well. The new deal teaches not only the supreme rights of the welfare of the people but that expediency and the mere round of activity are to be held more worthy than the ideals of honor and integrity for which men have been willing to die in the past. There have been such eras before. There was Machiavelli.

The question to be placed before the Supreme Court is whether the appointment of a commissioner, once presented to the Senate, can be withdrawn before that body rejects it. Governor Pinchot appointed Dr. King chairman of the commission before their friendship was disrupted by a bitter dispute (ELECTRICAL WORLD, April 22, page 502). The Senate never acted upon the appointment. When the Senate adjourned Governor Pinchot, contending that commission appointments follow the course of other executive appointments and lapse at the end of a legislative session if the Senate fails to act upon them, renominated Commissioners Goodnough, Stahlnecker, Woodruff and Gruenberg and designated Mr. Goodnough chairman. He did not reappoint Dr. King, who maintains that only rejection of his appointment by the Senate can terminate his tenure of office.

▼

Power Tax Compromise Reported to Senate

After reducing to 2 per cent the electrical energy tax which was fixed at 3 per cent in the bill passed by the House of Representatives, to replace the present 3 per cent consumer's tax (ELECTRICAL WORLD, May 6, page 561) and providing also that a tax of 1 per cent should be assessed upon industrial consumers of electrical energy, the Senate finance committee has ordered the measure reported to the Senate. The 2 per cent tax is to be levied upon producers as is provided in the House bill. The 1 per cent tax on industrial energy, on the other hand, is placed on consumers. The taxes expire June 30, 1934.

The Senate committee would make the law effective September 1 so as to permit any utility company which cannot bear the burden to apply to state regulatory commissions for increases in rates. The tax on industrial consumers would also take effect on that date.

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Electrochemists Hear of New Materials

Rhodium-plated jewelry, silverware and reflectors are now being marketed in competition with other electrodeposited metals of the platinum group. Latest of the newer bright metals to achieve popularity, rhodium offers the advantages of a pleasing pinkish-white luster with remarkable stability and freedom from chemical interactions at normal temperatures.

As described by Colin G. Fink and George C. Lambros at the 63d general meeting of the Electrochemical Society in Toronto this week, the world's annual production of the metal is comparatively small, 4,000 troy ounces, and it is two to 2½ times as costly as gold. Plating is most satisfactorily produced by the ammonium sulphate bath process.

New furnace refractory

An improved electric furnace refractory with a thermal expansion but one-ninth that of silica brick was described before the electrochemists by G. S. Diamond, who pointed out that its electrical thermal conductivities are much higher than those of silica refractories, giving rigidity up to the dissociation temperature of silicon carbide. The new brick, "Tercod," is inert to acid or neutral slag, but is attacked by basic slags. The brick consists of a mixture of silicon carbide with or without graphite, a carbon bond and a protective boro-silicate glaze to prevent oxidation.

Coming Meetings

National Electrical Manufacturers Association—Hot Springs, Va., May 22-26. A. W. Berresford, 570 Lexington Ave., New York.

National Fire Protection Association—Milwaukee, Wis., May 29-June 1. A. R. Small, 109 Leonard St., New York.

Edison Electric Institute—Chicago, Ill., June 5-8. B. F. Weadock, 420 Lexington Ave., New York.

Canadian Electrical Association — Lucerne-in-Quebec, June 14-16. B. C. Fairchild, Power Building, Montreal, Que.

American Physical Society—Chicago, Ill. June 19-24. W. L. Severinghaus, Columbia University, New York.

American Institute of Electrical Engineers—Summer convention, Chicago, Ill., June 26-30. H. H. Henline, 33 West 39th St., New York.

American Society of Mechanical Engineers—Chicago, Ill., June 26-30. C. W. Rice, 29 West 39th St., New York.

American Society for Testing Materials—Chicago, Ill., June 26-30. C. L. Warwick, 1315 Spruce St., Philadelphia, Pa.

Engineers' Day. Century of Progress Exposition—Chicago, Ill., June 28. G. E. Pfisterer, 308 West Washington St., Chicago.

Illuminating Engineering Society—Delavan, Wis., August 28-31. D. W. Atwater, 29 West 39th St., New York.

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General Public Utilities Company

Appointment of a receiver for the General Public Utilities Company has been sought by a bondholder of the organization. It is charged that the company is insolvent, that it has failed to meet a balance due on unsecured notes and that it faces a $3,375,000 maturity on December 1 which it will be unable to meet. General Public Utilities is indirectly a part of the American Commonwealths Power Corporation.

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Insull Men Arraigned; Eastern Units Linked

Seventeen former officers and directors of the bankrupt Corporation Securities Company, one of the Insull group, were arraigned last week before Federal Judge Wilkerson in Chicago on the indictment charging use of the mails to defraud in connection with the issuance of stock in the investment trust. Among those arraigned were Stanley Field, formerly chairman of the board of the Continental Illinois National Bank & Trust Company; Harry L. Stuart, head of Halsey, Stuart & Company, investment bankers, and Samuel Insull, Jr. At the request of United States District Attorney Dwight H. Green the names of Samuel Insull, Sr., who is in Greece, where extradition to the United States on a county grand jury indictment was denied, and Martin Insull, who is in Canada fighting extradition, were not read.

Attorneys for the indicted men filed demurrers and various motions to quash the indictment. The attacks upon the indictment contend that the charges are invalid "in that they omit to prescribe any standard of conduct of such definiteness and certainty as is required by the Fifth and Sixth Amendments to the federal Constitution." Hearing on the motions were set by Judge Wilkerson for June 1 and 2. Ten additional days also were allowed for filing detailed demurrers.

Penn Southern Power Corporation

An order giving effect to the creation of a new company to own certain former Insull properties in Eastern states and compromising all claims and counterclaims relating to these properties between four bankrupt holding companies, including the National Electric Power Corporation, has been signed by Irwin Kurtz, referee in bankruptcy. The new company, which is to be known as the Penn Southern Power Corporation, will own as its principal assets control of the Tide Water Power Company, the Florida Corporation, the Georgia Power & Light Company, the Penn Central Light & Power Company and the Michigan Electric Power Company (ELECTRICAL WORLD, May 6, page 562). An effort by R. G. Starr, counsel for the Utilities Power & Light Corporation, to have certain changes made in the order, before Federal Judge Woolsey in the United States District Court, was denied.

▼

Indiana Court Favors 6 1-2 per Cent Least Return

Setting the fair return to which a utility company is entitled at not less than 6½ per cent, a three-judge federal court at South Bend, Ind., maintained in a new interlocutory decree that rates set by the Indiana Public Service Commission for gas service from the Indiana Public Service Corporation at Logansport, Peru and Wabash would not yield more than a 4½ per cent return on fair value of property involved in the service. The court's original order had been sent back for explanatory details by the United States Supreme Court. The decree stated in part: "The fair annual return which the plaintiff is entitled to earn on the fair and reasonable value of the property, used and useful, in furnishing and supplying gas to the public is probably not less than 6½ per cent."

▼

Range Rentals Adopted by Irrigation Board

Though proceeding cautiously, the Turlock, Calif., Irrigation District has joined the increasing number of power supply enterprises offering electric range rental service to its customers. While no advertising was done during the first week that the rentals were available, other than a want ad in a local paper, six ranges were installed in that week. The territory has an estimated present range saturation of 40 per cent.

Customers are given their choice of any range on the district's self-supporting retail store's floor below $129 in price. Wiring costs are added to the price of the range and the customer pays for both at a rental of $1.60 a month. If the customer decides to buy the range and wiring during the first year, the total amount of rentals paid is deducted from the sale price.

In rented homes the district attempts to have the landlord purchase the wiring. Local contractors are given wiring jobs and if any contractor turns in a rental prospect, he is given preference for that wiring job.

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Standard Gas Earns $0.59 in 1932

(Year ended December 31)
(Consolidated Statement)

Earnings

Gross operating revenue	$131,705,854
	9.5% below 1931
Net operating revenue	$48,844,882
	15.5% below 1931
Balance available for common stock	$1,284,655
	85.1% below 1931
Earnings per share	$0.59
	in 1931, $4.09
Dividends paid on common stock	$2.07
	in 1931, $3.50
Charge to surplus to pay common dividends	$3,417,067

Balance Sheet*		Compared with 1931, Per Cent
Plant and property	$1,058,852,942	—3.9
Investments † (book value)	$ 56,013,344	+85.3
Current assets	$ 44,882,067	—11.3
Current liabilities	$ 12,434,997	+7.4
Funded debt	$ 485,440,034	—1.3
Reserves and surpluses	$ 148,997,849	—3.1

*Not including Deep Rock Oil Corporation (in receivership) on a consolidated basis.
†Includes $34,058,373 representing investments in and advances to Deep Rock Oil Corporation at book value.

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Pacific Gas Issues Report for 1932

(Year ended December 31) (Consolidated)

Earnings

Gross earnings	$85,058,617
	2.9% below 1931
Net earnings	$36,690,615
	6.5% below 1931
Operating ratio	.57
	in 1931, 45
Depreciation allowance	$11,426,139
	13.4% of gross earnings
	1.7% of plant investment
Times prior charges earned	2.3
	in 1931, 2.6
Net balance per share of common	$2.08
	in 1931, $2.73
Dividends declared on common	$1.99
	in 1931, $1.95

Output		Compared with 1931, per cent
Energy sales, kw.-hr.	2,932,003,000	12.5
Average use per consumer, kw.-hr.		989
		in 1931, 975

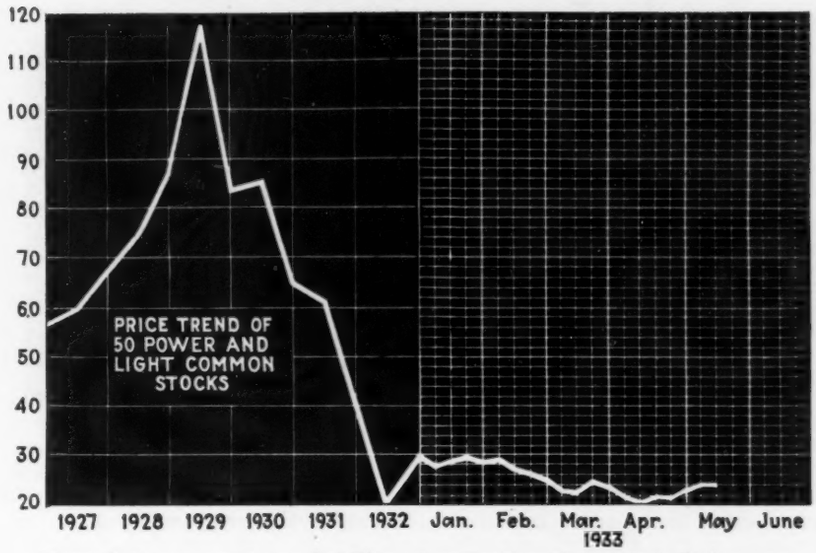
Balance Sheet		
Total assets	$718,322,031	+1.4
Funded debt	$305,975,400	—0.9
Capitalization	$600,600,052	+0.4
Total surpluses plus reserves	$ 96,392,706	+9.2
Ratio current assets to current liabilities		1.6
		in 1931, 1.4

Securities Bill Passes House and Senate

Regulation of the future sale of securities along the lines recommended by President Roosevelt (ELECTRICAL WORLD, April 1, page 401) was approved this week by the Senate, action having been taken without the formality of a record vote, after less than two hours of debate. The measure, substantially as the President sought it, was passed last week in the House by a unanimous vote. Aside from the Johnson amendment, providing for a federal corporation to represent holders of defaulted foreign securities, governmental or private, the measure differs chiefly from the House measure in that it provides severe criminal and civil penalties applicable to directors who sign false statements regarding the condition of companies offering securities for sale. Differences will probably be settled in conference.

The securities bill proper contains precautions for acquainting the public with the details of operations of companies issuing securities, providing a penalty of $5,000 fine and imprisonment for five years or both for violation of any of its provisions. Registration with the Federal Trade Commission of a complete statement of the condition of any company planning to issue securities in interstate commerce is required. Another requirement is the advertisement of detailed statements of financial condition, of the remuneration paid to agents selling the securities, the names of officers and directors and those responsible for the security and, in addition, the issuance of a folder containing the statements to be delivered to purchasers.

Utility Stocks Hold Gains



Speculation upon the probability of an early and drastic inflation was definitely curbed by the guarded assurances of President Roosevelt's radio message last Sunday. Security markets hesitated directionlessly, utility stocks reflecting the general situation. "Electrical World" average this week 24.0, last 24.1.

▼

Utilities, Inc., Under Ohio Ban

Ohio Securities Commissioner John W. Powers has denied Utilities, Inc., the right to sell 20,000,000 shares of common stock in that state upon the grounds that "the proposed offer of securities is upon grossly unfair terms." Utilities, Inc., was formed in February of this year (ELECTRICAL WORLD, February 25, page 248). Officials state that applications for permission to sell stocks have been approved in a number of states.

▼ ▼ ▼

Current Earnings Reports of Electric Light and Power Companies

Operating Companies

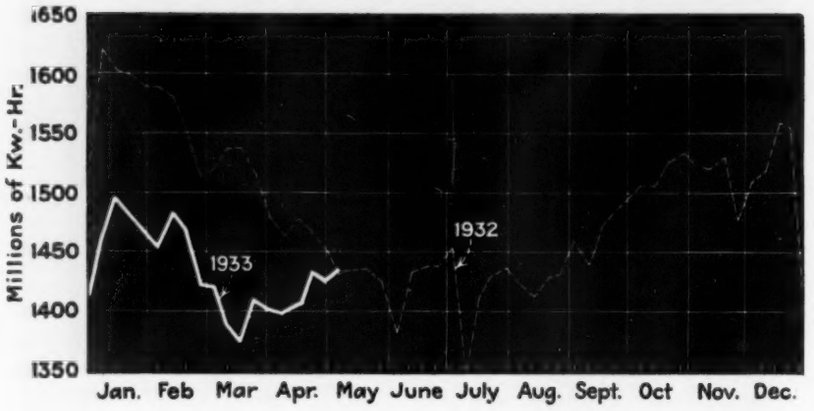
	1933	1932	Per Cent Increase	Operating Ratio 1933	Operating Ratio 1932
Alabama Power (Year ended March 31)					
Gross earnings	$15,199,973	$17,411,611	—12.7	48	49
Net earnings	7,915,195	8,792,925	— 9.9	..	..
Net balance	940,429	1,899,413	—50.5	..	..
Brooklyn Edison (Year ended March 31)					
Gross earnings	46,956,994	47,985,632	— 2.1	66	66
Net earnings	16,223,137	16,185,252	0.2	..	..
Net balance	13,254,479	13,721,304	— 3.4	..	..
Consolidated Gas, Elec. Lt. & Power of Baltimore (3 mos. ended March 31)					
Gross earnings	7,298,958	7,604,155	— 4.0	70	65
Net earnings	2,250,903	2,673,512	—15.8	..	..
Net balance*	1,579,618	2,051,843	—23.0	..	..
Consumers Power (Year ended March 31)					
Gross earnings	26,795,624	30,472,822	—12.1	53	50
Net earnings	12,564,514	15,097,695	—16.9	..	..
Net balance	3,839,104	6,863,382	—44.1	..	..
Georgia Power (Year ended March 31)					
Gross earnings	21,877,148	24,639,831	—11.2	49	52
Net earnings	11,256,572	11,848,728	— 5.0	..	..
Net balance†	2,116,646	2,923,752	—27.6	..	..
New York Edison (Year ended March 31)					
Gross earnings	68,251,528	74,940,029	— 8.9	71	67
Net earnings	19,494,893	24,484,375	—20.4	..	..
Non-operating revenues	12,283,514	10,619,373	15.2	..	..
Net balance	25,073,551	29,529,223	—15.1	..	..
Ohio Edison (Year ended March 31)					
Gross earnings	14,836,986	17,454,998	—15.0	49	45
Net earnings	7,630,460	9,571,570	—20.3	..	..
Net balance	1,951,107	4,119,807	—52.6	..	..
Puget Sound Power & Light (Year ended March 31)					
Gross earnings	13,058,358	15,295,163	—14.6	61	62
Net earnings	5,090,112	5,928,522	—14.1	..	..
Net balance	18,242	869,782	—98.2	..	..
Tennessee Electric Power (Year ended March 31)					
Gross earnings	$11,328,728	$13,375,104	—15.3	58	58
Net earnings	4,791,859	5,645,191	—15.1	..	..
Net balance	581,150	1,672,491	—65.5	..	..
Virginia Electric & Power (Year ended March 31)					
Gross earnings	14,981,911	16,727,942	—10.4	64	65
Net earnings	5,380,352	5,702,227	— 5.6	..	..
Net balance	2,303,981	2,704,936	—14.8	..	..

Holding Companies

	1933	1932	Per Cent Increase	Operating Ratio 1933	Operating Ratio 1932
American Gas & Electric and subsidiaries (Year ended March 31)					
Gross earnings	$57,832,857	$65,844,490	—12.2	59	56
Net balance	442,969	875,820	—49.5	..	..
American Water Works & Electric and subsidiaries (Year ended March 31)					
Gross earnings	42,452,538	48,590,157	—12.6	56	56
Net balance	1,834,603	4,855,085	—62.2	..	..
Engineers Public Service and constituent companies (Year ended March 31)					
Gross earnings	44,640,305	51,229,851	—12.8	63	63
Net balance	1,201,804	3,836,425	—68.6	..	..
Niagara Hudson Power and subsidiaries (Year ended March 31)					
Gross earnings	70,716,907	77,680,949‡	— 8.9	45	52
Net balance	7,680,302	13,295,791‡	—42.2	..	..

*Available for all dividends.
†After 1st preferred stock.
‡Changed to give effect to major adjustments made later in the year.
Gross earnings—(Operating Companies) Gross operating revenue. (Holding Companies) Gross operating revenue plus other income. Net earnings — Earnings after deduction from gross earnings of operating expenses taken to include taxes, depreciation, maintenance, operating, etc. Net balance — Balance available from income for common stock dividends.

Breaking a Three-Year Record



Continuing the strong upward movement of the past month and a half, in contrast with the normal seasonal decrease, central-station energy output has at last broken through the preceding year's figures. Production during the week ended May 6 amounted to 1,435,707,000 kw.-hr., or 0.5 per cent more than a year ago, according to the Edison Electric Institute.

With a few isolated exceptions in weeks containing a holiday, operations have been consistently under the preceding year's since the middle of 1930. The present rise reverses that situation. New England shows the greatest excess, now up to 3.8 per cent. The whole Atlantic Seaboard increased its lead. The Central industrial area rose 4 per cent.

Weekly Output, Millions of Kw.-Hr.

Week ended	1933	1932	1931	1930
May 6	1,436	1,429	1,637	1,689
April 29	1,428	1,455	1,644	1,698
April 22	1,431	1,470	1,676	1,725
April 15	1,410	1,481	1,641	1,733
April 8	1,399	1,465	1,647	1,715

Per Cent Change from Previous Year

Region	Week Ended May 6	Apr. 29	Apr. 22
Atlantic Seaboard	+2.9	+0.5	+0.1
New England alone	+3.8	+2.5	+1.1
Central industrial	—0.2	—4.2	—3.6
Pacific Coast	—3.5	—1.3	—6.4
United States	+0.5	—1.8	—2.6

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Federal Trade Commission Speeds Up; U.G.I. Next

Definitely speeding up the course of its investigation of public utility holding companies, the Federal Trade Commission has touched upon the activities of several groups and properties in the past two weeks. Following the conclusion of the first stage of the Cities Service investigation the commission made a brief study of the Utica Gas & Electric Company and St. Lawrence Securities Company, both of the Niagara Hudson group, and of the Central Public Service Company.

Late this week United Gas Improvement Company subsidiaries were due for hearing. These will be Connecticut Electric Service Company, Connecticut Light & Power Company, American Gas Company and United Engineers & Constructors, Inc.

Morgan fiscal policies

At its opening session last week the Federal Trade Commission heard Thomas A. Thibodeau, examiner, describe the difference in the fiscal policies applied to holding corporations by the J. P. Morgan interests and those used by the Aluminum Company of America. The hearing covered the St. Lawrence Securities Company, which controls through stock ownership the St. Lawrence Valley Power Corporation, St. Lawrence County Utilities, Inc., Antwerp Light & Power Corporation, Norwood Electric Light & Power Company and the Ogdensburg Street Railway Company.

"During the more than twenty-three years the Aluminum Company of America controlled the St. Lawrence Securities," the examiner testified, "the aggregate income of the securities company was $4,117,800, of which $3,922,429 represented dividends from subsidiaries. The net profit to the Aluminum company was $1,408,405. For the two years—1930 and 1931—of control by the Niagara Hudson Power Corporation (of the J. P. Morgan interests) an aggregate income of $4,371,580 was shown. This contrast of returns under the control of the two companies," the examiner said, "was explained by the fact that during the period of the Aluminum company control the major portion of the earnings of subsidiaries were retained by the subsidiaries instead of being declared out as dividends, whereas a contrary policy was inaugurated when the Niagara Hudson acquired control."

12,750,000-Hp. Capacity Linked in Northeast

Completion of the Niagara Hudson-New York Edison tie line (ELECTRICAL WORLD, May 6, page 561) has led to compilation of figures on the "world's greatest power pool," brought about by the linking of virtually all the important power resources of the northeastern section of the United States. Those inclined to mere numbers without regard for the technical possibilities of using the power represented in the way implied have juggled such items as: A network of 11,540,000 hp., which with 1,233,000 hp. from Canada makes a total interconnection of 12,773,000; area served, 116,000 square miles; involves one-fourth of the developed water-power resources of the United States, one-fourth of the steam-generating plants and one-fourth of the population.

As evidence of the transfers of load for economic reasons it is estimated, on the basis of a recent compilation, that approximately 20 per cent of the energy generated in the northeastern section of the country finds its way over interconnecting lines before reaching the consumer of the system on which it is used.

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India Has 3,080-Ft. Head Plant

Formal opening was made last month of the highest head plant in the British Empire. With a gross head of 3,080 ft., at Pykara Falls on the Nilgiri plateau in India, a 24,500-kw. project has been developed. This hydro-electric scheme is the first venture of the Madras government in electricity generation, transmission and distribution under the policy adopted by the presidency of the state in 1925.

▼

Paris Municipal Again Blocked

Unsuccessful in earlier efforts to block the consummation of the contract recently made by the city of Paris, Ky., and the Fairbanks-Morse Company for the erection of a municipal power plant (ELECTRICAL WORLD, March 25, page 372) the Kentucky Utilities Company has filed suit to have the contract set aside. Grounds alleged are the impairment of the best interests of Paris.

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Columbia Valley Backers Active

To follow the gigantic Tennessee Valley project upon its presumable, but not probable, career of national salvation proponents of the contemplated $600,000,000 development in the Columbia River valley of the Pacific Northwest are making plans to insure the consummation of the undertaking. The estimated cost of power to be developed is 1.38 to 1.55 mills a kilowatt-hour. A

3,000,000-hp. development is discussed, which would involve the reclamation of 2,000,000 acres of now arid land.

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Speakers and Topics Announced for N.E.M.A.

"At no time in his history has the electrical manufacturer been faced with conditions such as now confront him, and at no time has his trade association and its proper conduct been of such vital intimate concern," advises A. W. Berresford, managing director National Electrical Manufacturers' Association, in announcing the program of the regular meeting to be held this month. "Action of some kind, and probably of a nature hitherto uncontemplated, is being forced upon him," says Mr. Berresford in pointing out the desirability of having manufacturers well represented.

Speakers and their announced topics for the meeting, May 22-26, are: Gerard Swope, "Present Economic Changes and Their Effect on Industry"; President Tritle, "Problems Forced on the Electrical Industry by Inflation, Sales Taxes, Thirty-Hour Week, Minimum Wage Legislation and Other Influences"; Francis E. Neagle, "The Practical Possibilities for United Industry Action, and the Legal Aspects Thereof, in the Rapidly Changing Economic Situation." Three other speakers will deal with the specific problems which face the electrical manufacturer. Clarence L. Collens will state those of the engineering materials division, C. E. Wilson those of the supplies division and A. G. Kimball those of the appliance division.

It is thought, says Mr. Berresford, that these presentations and the resultant discussion will afford the executive committee sufficient material to permit the formulation of definite recommendations for consideration and action during the week.

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New Tubes for Gaseous Lighting

An interesting departure in gaseous discharge lighting is reported from the Netherlands, where glass manufacturers have devised a new type of tube. Unlike the usual form, the recently produced design is divided internally into two or more longitudinal sections by thin diaphragms of glass. Each compartment can be filled with suitable gases to give any desired color, thus in combination yielding any variation. By imparting a helical twist another interesting effect may be produced.

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Beauharnois Plan Approved by Security Holders

At meetings called by the official protective committee (ELECTRICAL WORLD, April 15, page 470) bondholders and common-stock holders of the Beauharnois Power Corporation have accepted the Montreal Power plan for reorganizing the financial structure of their company. The plan calls for the underwriting by Montreal Light, Heat & Power Consolidated of Beauharnois first mortgage bonds to the extent of $13,500,000 to carry on construction work in connection with the great hydro-electric plant on the St. Lawrence River near Montreal. Reorganization became necessary when the Beauharnois company defaulted on its bonds last year.

Offered in opposition to the Montreal Power plan were a plan sponsored by R. O. Sweezey, who long was connected with the Beauharnois undertaking, and one sponsored by a group from Toronto, headed by H. Pepall. These plans converged in certain aspects and diverged in others, but it was argued for both that they contained more liberal provisions for the debenture holders in that interest payments, whether in cash or scrip, would commence earlier than under the Montreal Power plan, which provides that the debenture holders are to forego interest payments until 1937, although in consideraiton of this they will receive one-half share of common stock for each $100 principal amount of bonds which they own.

The Montreal plan, however, was adopted by an overwhelming vote, empowering the Montreal Light, Heat & Power Company to proceed with future development of the project. The plan now has only to obtain the seal of approval of the Dominion Government to make it operative.

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Major New Construction This Week

Bids soon to be asked by Bureau of Power and Light, Los Angeles, Calif., for construction of two-circuit steel tower transmission line from city to Hoover Dam, Boulder City, Nev., 271 miles, requiring 2,256 single and double steel towers.

Motors, controls and general electrical equipment will be installed in new plant at East Moline, Ill., of General Harvester Company. Cost about $200,000.

Heavy-duty motors, hoists, etc., will be installed for rebuilding of coal tipple of Mohawk Mining Company, Kittanning, Pa. Cost about $70,000.

General electrical equipment will be purchased by Fort Sutter Brewing Company, Sacramento, Calif. Cost $250,000.

Motors and general electrical equipment will be installed in addition to plant of Standard Chromate Company, Painesville, Ohio. Cost over $65,000.

General electrical equipment required for new plant of Great Lakes Brewing Company, Grand Rapids, Mich. Cost over $230,000.

General electrical equipment will be installed by Cold Spring Brewing Company, Cold Spring, Minn. Cost $125,000.

Refrigeration Sales Boom

Orders from every one of the 48 states, "piling up faster than we have been able to fill them," are reported for domestic refrigerating units by President E. G. Biechler of the Frigidaire Corporation. It is announced that this organization will more than double its output for May as compared with the same month last year. May production will be the largest of any month since July, 1929, for Frigidaire. More than 7,500 men are at work in the company's two plants at Dayton.

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New York Metal Prices

	May 2, 1933 Cents per Pound	May 9, 1933 Cents per Pound
Copper, electrolytic	6.50	6.75
Lead, Am. S. & R. price	3.50	3.65
Antimony	6.25	6.25
Nickel ingot	35.00	35.00
Zinc, spot	4.10	4.10
Tin, Straits	32.375	36.00
Aluminum, 99 per cent.	23.30	23.30

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Abitibi to Operate Soon

Procedure to completion with the Abitibi canyon hydro-electric enterprise is planned by the Hydro-Electric Power Commission of Ontario. It is hoped that 100,000 hp. may be made available there by May 15. The total capacity of the project will be 275,000 hp., but only two units will be started at this time.

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Delinquent Electrical Accounts

(National Electrical Credit Association)

Number of Accounts Reported

Division	April 1932	April 1933	Per Cent Inc. or Dec.	Four Months 1932	Four Months 1933	Per Cent Inc. or Dec.
New York	212	155	—26.9	935	680	—27.3
Middle and Southern Atlantic	101	63	—37.6	470	260	—44.7
New England	106	103	— 2.8	480	281	—41.5
Central	542	304	—43.9	2,150	1 099	—48.9
Total	961	625	—35.	4.035	2,320	—42,5

Total Amounts Reported

New York	$22,041	$9,590	—56,5	$97,049	$43,795	—54,9
Middle and Southern Atlantic	17,616	13,035	—60.1	41,829	15,251	—63.5
New England	15,092	15,770	—13.3	36,684	17,319	—52.8
Central	36,954	17,135	—53.6	165,958	70.735	—57.4
Total	$71,703	$35,530	—50.4	$341,520	$147,100	—56.9

Staff Cut by Missouri Board

Though 42 employees were dropped as of May 1 in order to save more than $152,000 during 1933-34, John C. Collet, chairman of the Missouri Public Service Commission, has stated that the eliminations will not interfere with pending audit and appraisal projects of the commission, but may prevent some work planned for next year.

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Hay Fever Relief, Electrically

"Complete relief" for hay fever sufferers in less than two hours when using an air-conditioned room has been reported by Dr. Leslie N. Gay of Johns Hopkins University to the Society of Hay Fever and Asthma. This relief, said Dr. Gay, depends primarily upon the cleansing and chilling of the air. The temperature was kept ten degrees below that prevailing outdoors and with a humidity below that outside.

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Binghamton Municipal Survey

Survey of the possibilities of establishing a municipal plant at Binghamton, N. Y., has been authorized by the city and L. T. Klauder, who directed the municipal developments at Jamestown, N. Y., and Hagerstown, Md., has been retained to make the preliminary study.

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Utility Accounting Hearings Set

Standardization of accounting systems of public utility companies in the State of New York is being sought by the Public Service Commission, which has prepared a uniform system of accounts for each branch of the public utility industry, including electric, gas, steam, etc. Hearings will be held for electric corporations on May 24.

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Standards Year Book Issued

In the 1932-1933 year book of the American Standards Association no less than 75 approved American standards and uncompleted projects involving the generation of electrical energy, its use and application and the equipment necessary for that are reported upon. During the past two or three years, states Howard Coonley, president of the association, more projects have been submitted to the A.S.A. for development than ever before in its history.

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Revenues From Electric Boats

Quite the rage in England, small electric pleasure boats, such as startled visitors to the World's Columbian Exposition in 1893 and will help entertain sightseers at the Century of Progress Exposition this year, are yielding interesting revenues overseas. At Felixstowe, according to *Electric Vehicles and Batteries* (England) a fleet of twenty boats brings in as much as $960 a day. The batteries used are of 12-volt type and last approximately four hours in continuous use before requiring recharging. Battery replacements in the design used may be made in three minutes. The boats accommodate one passenger.

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As to Rates——

•To prevent the city of Louisville from enforcing reduced rates, the Louisville Gas & Electric Company has brought suit in federal court against the city, its Mayor and director of law, asking a permanent injunction and restraining order against the new ordinance providing for reduced rates (ELECTRICAL WORLD, April 29, page 536). The suit asks that the 1933 electric rates be declared null and void and describes the ordinance as an attempt to take the company's property without due process of law. Judge Cochran of the Eastern Kentucky district court issued a temporary restraining order and set June 9 as the date to hear evidence at Louisville.

•Investigation of rates and charges of the Alabama Power Company and Birmingham Electric Company has been ordered in citations against these companies by the Alabama Public Service Commission. Hearing on the Alabama Power citation was set for June 20 in Montgomery and hearing on the Birmingham Electric citation was set for May 25 in Birmingham. In these hearings the commission will undertake to ascertain whether the rate and charges of the companies are unjust or unreasonable. For more than two years citizens of Birmingham and suburban areas have been demanding lower rates and resolutions to that effect have been adopted by several organizations (ELECTRICAL WORLD, April 29, page 536).

• New residential rates for electricity in Yonkers designed to save the consumers about $120,000 a year have been approved by the New York Public Service Commission (ELECTRICAL WORLD, April 22, page 505).

•Substantial reductions of rates have been announced by the Southern Utah Power Company and the new schedules have received the approval of the state Public Utilities Commission. The rates for residence lighting have been 12 cents per kilowatt-hour for the first 30 and 9 cents for all above that figure. The new rates are 10 cents for the first four kilowatt-hours per room and 7 cents for all above that amount. Affecting, it is said, 30 per cent of the users is the new minimum rate of $1 net per month, which compares with the present $1.25 a month.

•Schedule of reduced electric rates of the Staten Island Edison Corporation filed with the New York Public Service Commission (ELECTRICAL WORLD, April 22, page 504) has been approved by that body. The new schedule will save electric customers in the Borough of Richmond more than $255,000 annually.

•Customers of the Windham Electric Company, Trumbull County, Ohio, have won their fight against the company for lower rates (ELECTRICAL WORLD, April 22, page 504). The Public Utilities Commission has ruled the existing rates excessive and ordered reductions.

Illinois commission negotiates with Commonwealth Edison

Even though the company regards present rates to be virtually confiscatory it is willing to make some concessions to all classes of customers, Harry Dunbagh, attorney for the Commonwealth Edison Company, told the Illinois Commerce Commission this week. The commission is investigating the utility in connection with its state-wide drive for lower rates to consumers of the state upon the basis of today's costs and values (ELECTRICAL WORLD, April 22, page 500).

Chairman B. F. Lindheimer of the commission was insistent that reductions must include all residential rates. He pointed out that though the hearings were being held informally to avoid the delays attendant upon formal hearings the conference results would be as complete as an actual hearing.

"We are," said Mr. Dunbagh, "talking about a reduction in rates where legally no reduction could be compelled."

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With the Legislators

ILLINOIS—Power which would give the Illinois Commerce Commission jurisdiction of utility subsidiaries and affiliates is being sought in bills submitted to the Legislature. One measure would empower the commission under certain conditions to place in effect a temporary lower scale of rates prior to the completion of the investigation of the fairness of present rates, provision being made for the extension of the commission's jurisdiction to include all affiliated and holding companies in respect to any transactions between the public utilities and their affiliates. It is also provided that no public utility may directly or indirectly guarantee the performance of any contract or obligation of any other person, firm or corporation. No public utility is to use, appropriate or divert its money, property, or other resources, other than any earned surplus, in any business not necessary or proper to the business of the public utility. Another bill provides that the burden of establishing the value of a public utility's property is placed upon the utility and the expense of valuations and investigations is like-

wise to be borne by utility companies.

MASSACHUSETTS—House has passed a bill under which the sale of securities of public utility holding companies must be authorized by the State Department of Public Utilities.

MICHIGAN—Broader power for the Michigan Public Utilities Commission is sought in a bill introduced in the Senate, providing that the commission initiate its own investigations of rates. The bill would prohibit all payments to holding companies or affiliated companies under any contract unless the contract was approved by the commission. Utility companies would be required to give bond that in case a rate reduction were ordered they would refund the difference accumulated after the rate hearing began. The Governor or either branch of the Legislature would be authorized to require reports by the commission on demand.

MINNESOTA—Certain acts enlarging the powers of the water, light, power and building commission in villages of the state have been passed by the Legislature and approved by the Governor.

NEW JERSEY—Bills designed to confer upon the state tax commissioner the power to equalize taxes of public utilities were passed in the House last week after heated debate.

New York City Utilities to Cease Merchandising

Following the precedent set in New York State by Niagara Hudson properties and forced by legislative enactments in other commonwealths, all the New York electric light and power companies affiliated with the Consolidated Gas Company will abandon merchandising on July 1. Companies involved are the New York Edison, United Electric Light & Power, Brooklyn Edison and New York & Queens Electric Light & Power companies.

It is announced that none of the twenty company stores involved will be closed, that staffs will be maintained, but that no electrical equipment or lamps will be offered for sale. The stores will be used for demonstration and display. The companies will continue to do promotion work in co-operation with retail outlets.

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World's Fair Space Well Sold

Price for all uncontracted for display space in the Century of Progress Exposition buildings will be advanced 10 per cent over present rates this week. No space will be sold after June 1, the day the exposition opens. In a letter to prospective exhibitors Harry C. Wanner, chief of the exposition's division of applied science and industry of the exhibits department, said in part: "Exhibit sales now constitute 92 per cent of occupancy. Up to May 1, according to Mr. Wanner, $5,700,000 worth of exhibit space had been sold and placed under contract. The Electrical building is 90 per cent sold.

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Forty-Year-Old Light Will Open the Fair

Taking no chances with obscured skies, engineers planning the delicate feat of harnessing light which started earthward forty years ago from the star Arcturus, at the time of the World's Fair Columbian Exposition, will use impulses received through four observatories to open the Century of Progress exposition this year. General Electric will co-operate with the Yerkes and Harvard observatories, while Westinghouse will work similarly at Allegheny, Pa., and Urbana, Ill. Photoelectric cells will pick up the light which amplifying equipment will bring to effective levels.

Here are Edwin B. Frost, former director of the Yerkes observatory; C. T. Elvey, G. E. specialist in stellar photometry, and Otto Struve, present director at Yerkes.

Soviets Plan 150,000 Kw. North of Arctic Circle

In spite of the obvious construction and operating difficulties in the development of hydro-electric resources in such latitudes Soviet engineers are proceeding with a program for power projects north of the Arctic Circle. In a region of extreme cold, where sudden winds and blizzards are usual and ice conditions difficult for the greater part of the year, one station of 60,000 kw. is nearing completion. The total contemplated output of the three stations, which will operate under heads of 50, 120 and 255 ft. to utilize the fall of 425 ft. between Lake Imandra and the White Sea, is 150,000 kw.

Development is taking place at this point on the Kola peninsula in order to take advantage of extensive deposits of apatite from which phosphoric acid and aluminum are obtained. The deposits are extremely rich, being at least 650 ft. deep in places and capable of an output of 4,000,000 tons of apatite a year.

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Largest Refrigerator Sales Reported by Kelvinator

April was the best month, so far as the number of units produced is concerned, which Kelvinator Corporation, established for nineteen years, has known. An increase over the April average for the previous five years of 47 per cent is the import of the shipment of 30,116 refrigerating units. The all-time record for the organization had previously been 25,427 units in April, 1932.

"That this performance is not a temporary spurt is evidenced by the fact that we have on hand today unfilled orders representing 217 per cent of those on hand May 1, 1932, and 323 per cent of those on file a month ago," G. W. Mason, president, said. "This is the biggest bank of unshipped business that has ever accumulated on our books.

"This increase is justified by the bank of unfilled orders which we are carrying into the new month and by the reports of constantly increasing demands which our executives are bringing in from the field. Unit shipments for the current fiscal year are already ahead of last year."

EDITORIALS

L.W.W.MORROW
Editor

Pick up the hand

THE new deal for the control of business was explained briefly by President Roosevelt last week. He urged that wages be increased as prices rise. He told industry to bring order out of chaos in business practices by co-operative action between business units and with the government, and finally he advised industry to view its activities and reorganize them to improve the national economy as well as the industry economy.

The hand has been dealt. It is now up to industry to play the cards. We hope that the electrical manufacturing industry will not delay the game because of the present up-turn in business. Now is the time to place this branch of the industry on a sound and profitable basis. The trade association should show competency and take a chance on the anti-trust laws by moving toward industry control and discipline in the public interest.

It is not an easy task. Controlled production and consumption—steady employment—minimum prices—allocation of customers—these are nice phrases that become practical business problems when any attempt is made to apply them. Definite facts must be had on costs of production and on costs of distribution, and these costs must be proved to be necessary before they can be used as evidence to fix minimum prices or to stop additional production. We venture to say that costs of distribution are unknown now, and that even the factory cost of a given product will vary from 20 to 100 per cent in the several plants.

After costs are obtained and cost-accounting systems are instituted there must be definite data on quantities of production and sales in national and regional markets. There must be formulated a basis for taking care of overproduction, even to the extreme of closing down factories. There must be formulated ways to cut the costs of distribution by removing duplicated sales efforts and consolidating sales agencies. Then comes the problem of adjusting the distribution system on a classification of accounts basis in the market areas. Wages and material prices are not uniform in all areas, and these variations must be considered. In addition, the wholesaler and the retailer trade associations must develop their mechanism and correlate their activities with those of the manufacturers. Above all, there must be centralized authority, pledged commitments and the power of enforcement.

This is no simple game and the rules are as yet unknown. But, for the first time in years, industry has been dealt a hand and it can start to play. We hope the electrical manufacturers will face the opportunity fearlessly and frankly at the Hot Springs meeting. We hope they will commit themselves to a general policy of industry control and discipline. We hope this work will be started with a full and sympathetic understanding of the philosophy announced by President Roosevelt. The game must be played in the public interest and the game will require the concentrated attention of the best minds in the industry. The stakes in view are large enough to warrant the effort

Inflation and the utilities

GOING off the gold standard and the commitment of the administration to a policy of rising prices is very significant to the public utilities. We believe that these actions will benefit the utilities provided the rise in prices is held to a reasonable magnitude. Utility rates remained about fixed during the depression, but if the bitter end of deflation had been faced undoubtedly utility rates would have been driven down and all equities would have been wiped out until the debt structure could have been supported.

The inflation contemplated, of course, will not boost utility rates and it will raise the prices of

materials and possibly labor. But if the price rise is controlled the increased costs will not even offset the economies introduced during the depression if there is a restoration of normal load. Net earnings will be maintained and even increased in all probability, and it will be possible to support the present tax burdens and debt structures.

At this time the utilities should resist or stave off agitation for unreasonable rate reductions and should try to limit taxes to present values at least. They also can well afford to make normal expenditures for necessary supplies and equipment and for maintenance and rehabilitation at this minimum price level. They should support all endeavors to stabilize the dollar value to, say, the 1926 level, which is about the average value during the period of very large expenditures.

So far there is no doubt that the courageous acts of the President have helped the utilities. They could not face complete deflation without disaster. Nor can they face complete inflation, but there is every reason to believe that control will be maintained to secure only a limited increase in prices. Add to these conditions a restoration of normal business and the utility companies will be sufficiently prosperous to continue the expansion and developments so essential to the national welfare.

Patchwork improvements

OPERATING engineers have lost much sleep lately by being forced in many cases to balance their administration of plant on the slippery tightrope of inadequate appropriations. On one side they carry the heavy burden of orders to save every last nickel in expenses, and on the other the bulky load of maintaining by patchwork jobs continuous service of good quality with plant which is steadily depreciating. In other cases plant has been added to factories and utility systems without any realization on the part of the directors and banking interests concerned that substantial outlays should be made at once to bring both equipment and methods up to current standards of practice.

There has been no time in the past 42 months when it was as important as it is now to take adequate measures to avoid major breakdowns in equipment which has been subjected to deferred maintenance or allowed to run less efficiently. Increased production and loads will show up weak spots. If engineers can sell the idea of service and economy through modernization to their executives, the latter ought to be able to convince committees of directors that the time has arrived to spend money to save more money. It will not take many major interruptions of service to important customers or machines to turn the tide, but this should not be necessary with the engineering talent available.

Bare neutral moves on to full acceptance

RECENT action of the National Electrical Code Committee in approving the general use of bare neutral service cable is to be welcomed by the entire electrical industry. It is generally conceded that this step is not only an advance in safety of service installations, but will also considerably reduce their cost and thus further promote electrical development. A logical development of this will be—and the steps looking toward this have already been taken—the early approval of the bare neutral method of house wiring. This is now permitted in a number of towns and cities and is being tried on a considerable scale in many sections of the country. Further, during the discussion of this question on the floor at the last electrical committee meetings it was definitely recommended that inspectors give serious consideration to responsible groups wishing to make trial installations of bare neutral wiring.

This phase of the wiring question is of particular importance in view of its close relationship to the problem of safety, and particularly safety to property. Experience gathered during the past few years tends to indicate more and more that the generally accepted method of wiring, consisting of a two- or three-conductor cable covered by a high-resistance steel armor, is hazardous under conditions of live conductor grounding to the armor. The reason for that is that such a ground will frequently result in a high-resistance short which generally will not draw enough current to blow the protective fuses, but may draw high enough value of current to cause excessive armor heating and so result in combustion. In such a case the bare neutral cable is entirely safe. All this ought to be more thoroughy studied perhaps by a proper joint group; why not by a joint N.E.M.A., E.E.I. and N.F.P.A. committee?

Power Economics of the Tennessee Project

FROM the standpoint of the ambitious hydro-electric engineer there is hardly a "sweeter proposition" anywhere within our borders than the Tennessee River and its tributaries. Army engineers, during an exhaustive survey, drew maps which hardly leave an unpooled spot anywhere between dams; on tributary after tributary and on the Tennessee itself the pool created by one dam can have its upper-end ripples lapping the base of the dam above. That is, it can if no thought is given to ultimate cost. Nature provided many tributaries, it tipped their sources up 1,700, 2,500 and even 3,000 ft. into the Appalachian range. Better than that, it laid out the lateral profiles so that natural pools could be created without flooding too much terrain. Thus exists the technical basis for the recent bills to develop the power, flood control, navigation and industry possibilities of the Tennessee Valley. Small wonder that the government ownership crowd and those long obsessed with a "Power Trust" complex should fight for ten years and more to put the government into the power business in Tennessee in ten-figure magnitudes.

The Tennessee-Holston is about 860 miles long. The useful tributaries total about 2,500 miles. On this ramified waterway there is the potential opportunity to develop 149 hydro-electric plants of varying magnitude. Full development of all these plants, with a moderate amount of auxiliary steam power and the correlated navigation and flood-control features, represents an outlay of more than $1,100,000,000. Under controlled flow the system could produce 3,000,000 kw. of firm power. The carrying and operating charges, with all except locks, barge lifts and purely navigation channel outlays charged to power, would mean a cost of 4⅓ mills per kilowatt-hour at the high-tension buses, according to the Secretary of War's report to the 71st Congress (H.D. 328).

Earliest among these developments would be the chain of major dams and plants in the 650-mile stretch of the Tennessee from Knoxville to the Ohio junction at Paducah, with Muscle Shoals (No. 1 and Wilson Dam) falling near the middle. All of these would be run-of-river plants, benefiting, of course, by the regulation of the flow afforded by such storage plants as are dovetailed into the program. First and foremost among these is the Cove Creek project at the junction of the Powell and Clinch Rivers. This is recognized as the key project, upon which the feasibility of hydro development of the whole Tennessee Basin depends for a chance at economic success.

A quarter billion at first

The army engineers set up two systems: One, System A, comprises Cove Creek, Clinton, Melton Hill, Kingston, Hales Bar and Dams Nos. 2 and 3 at Muscle Shoals. Dam No. 2 is the present one known also as Wilson Dam. The other, System B, comprises all the projects of the entire system, on the main stream and on the tributaries. Storage in either plan would have the triple effect of aiding navigation, preventing flood and offsetting steam capacity otherwise needed to make the hydro developments at all feasible economically.

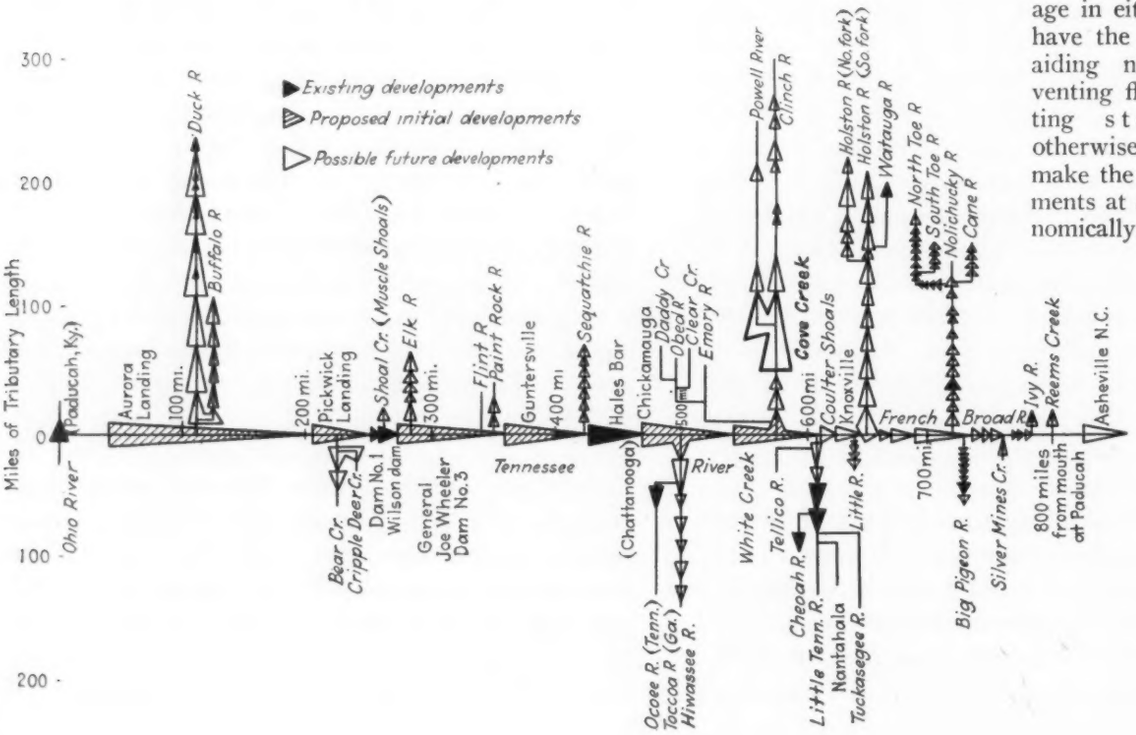


Fig. 1—Grandiose program embraces continuous chain of plants on 3,300 miles of Tennessee River and its tributaries

Seven million kilowatts, four to six-mill power, outlay of a billion dollars.

Capacity excess now of one-third in the district.

Present steam and hydro nearer load centers already providing cheap power for home and industry.

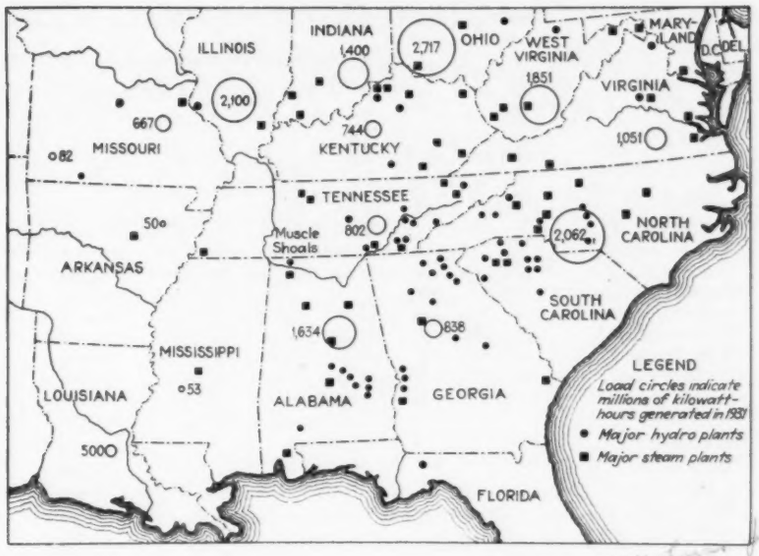


Fig 2—Main load centers now served by plants with short transmission distances

Proposed developments on the Tennessee itself (Table I) represent an outlay of $249,000,000, with annual charges of $32,400,000 to power production. The 2,000,000 kw. would be able to generate a kilowatt-year for $35.97 and a kilowatt-hour for 4.01 mills. Plants on the tributaries would constitute another 2,200,000 kw. of capacity costing $705,000,000. Taking the two systems or stages of development (Table II) propounded by the army engineers, the first, A, would offer 1,461,000 kw. of hydro and steam capacity at a cost of $176,345,300, with an estimated generation cost of 3.51 mills. The ultimate system, B, would bring the total capacity up to 6,000,000 or more kilowatts at an outlay of $1,100,000,000 and could generate power at 4.33 mills per kilowatt-hour.

So far the portrayal has been principally that of the engineers' and the politicians' dream. On the other side is actuality. That actualitiy can best be set up by citing data from the operations of the Commonwealth & Southern Corporation system subsidiaries—Tennessee Electric Power Company, Alabama Power Company, Georgia Power Company, Mississippi Power Company, Gulf Power Company, South Carolina Power Company—all serving areas in or practically contiguous to the Happy Valley of Tennessee. These companies have 834,000 kw. of hydro plant capacity and 400,000 kw. of steam. They serve 430,000 electric consumers in the 1,678 towns which lie in some 196,000 square miles of area. In building up this integrated system 307 municipal systems have been absorbed, and of the remaining 78 there are 58 which buy at wholesale from the Commonwealth & Southern system.

Whatever market is available for the proposed government system within this area is the market cultivated by, reached by or accessible to the existing system. Whatever transmission lines are necessary to deliver Tennessee Valley hydro over the Southeast already exist as a part of the southern network of transmission lines or would be inherently and appropriately a part of it. There are in the Commonwealth & Southern system 20,000 miles of high-tension lines and 17,000 miles of local distribution lines.

In 1930 these companies put out 3,600,000,000 kw.-hr.; lately it has been about 10 per cent less than that. Within the whole Tennessee Basin the Census data show a decline from 18,250,000,000 in 1930 to 17,500,000,000 in 1931 and a further decline to 16,000,000,000 last year. The expected market demand on which plant capacity had been prognosticated and built was 26,000,000,000. Surplus capacity for the entire Commonwealth & Southern system territory is correspondingly placed at 250,000 kw., due to slump in consumption and unabsorbed capacity growth. A billion kilowatt-hours per year could readily be handled by this capacity at 40 per cent load factor. Adding the commitment for power from Muscle Shoals and the Sheffield steam plant there is today capacity 66 per cent in excess of current send-out. This is the area in which the government plans to lay out a billion dollars to develop 3,000,000 kw. of firm capacity and an output of 25,000,000,000 kw.-hr. per year.

Approximately 1,000,000,000 kw.-hr. was generated and distributed in the immediate Tennessee territory in 1931. The demand estimated by the army engineers for 1950 is close to 6,000,000,000. The 149 projected plants could produce 25,000,000,000 and those on the main stream alone 12,500,000,000 of this amount. On the other hand, the 350-mile transmission radius talked about involved a utility send-out of 17,000,000,000 in 1931. This constitutes 65 per cent of what would be produced by the full Tennessee development. The capacity of the existing utility plants has an excess value at the moment much in excess of 35 per cent; adding Muscle Shoals makes it even more. These plants could readily produce 22,000,000,000 kw.-hr. Adding the potentiality of the whole valley scheme there would be a surplus of 33,000,000,000 kw.-hr. per year.

Fifty years to absorb excess

At the rate of growth which has prevailed in this area over the last five years it would take 50 years to absorb the excess. Meanwhile, not another plant, steam or hydro, could be built in the territory to interfere with this absorption, no matter how much more economical the production cost by steam might be. It is evident the development will have to move slowly even if the markets of the existing utilities are ruthlessly pre-empted and fertilizer and other huge industries induced to migrate into the Tennessee neighborhood.

A glance at the map (Fig. 2) shows hydro and steam

Table I—149 Plants Contemplated in Billion Dollar Tennessee Scheme

Development	Miles Above Mouth	Elevation Pool	Elevation Tail	Power Data: Firm Power Hydro Storage Base (Kw.)	Power Data: Potential Storage (Kw.-Years)	Power Data: Kw. Capacity No. of Units	Power Data: Kw. Capacity Of Units (50% Ld. Fac.)	Power Data: Kw. Capacity Of Plants	Estimated Total Cost	Annual Charges to Power: Total Including Storage and Steam Auxiliary	Annual Charges to Power: Net Balance Paid for Storage	Annual Charges to Power: Total Cost of Production of Power	Cost of Power: Per Kilowatt-Year	Cost of Power: Per Kw.-Hr. (Mills)
Tennessee River														
Aurora Landing	43	352	311	194,300	2,170	22	18,270	402,000	$49,876,798	$5,151,450	2,049,223	$7,200,673	$37.06	4.23
Pickwick Landing	206	408	361	195,200	1,920	20	19,800	396,300	45,560,610	4,577,644	2,083,955	6,661,599	34.13	3.89
Joe Wheeler (No. 3)	275	551	505	172,900	4,850	18	19,600	352,900	44,850,100	4,335,628	1,866,850	6,202,478	35.87	4.09
Guntersville	354	589	560	97,200	4,350	16	13,170	210,690	31,655,650	2,775,536	841,100	3,617,332	37.22	4.25
Chickamauga	472	676	636	117,200	6,250	14	15,800	221,300	30,835,848	2,829,252	1,309,971	4,139,223	35.32	4.03
White Creek	543	714	684	68,200	2,630	12	20,530	246,340	29,277,550	1,932,184	634,341	2,566,525	54.03	6.16
Coulter Shoals	605	802	752	56,600	2,230	6	20,400	122,365	16,869,120	1,449,070	598,056	2,047,126	36.16	4.13
Totals				901,600	24,400	108		1,951,895	$248,926,706	$23,042,764	$9,383,496	$32,434,956	$35.97	4.01
Tributaries														
Duck River						14		111,310	$32,450,880					
Buffalo River						10		24,900	13,789,920					
Bear Creek						4		8,200	9,535,060					
Shoal Creek						2		3,650	1,648,320					
Elk River						10		55,150	24,362,520					
Paint Rock River						4		7,850	5,879,650					
Sequatchie River						14		15,400	12,816,400					
Hiwassie River						18		290,810	68,172,310					
Cove Creek						3		165,000	*43,584,040					
Clinch River						21		166,650	57,501,466					
Emory, Obed, etc						36		98,840	50,755,850					
Powell River						6		36,200	24,174,447					
Little Tennessee River						6		116,800	26,252,220					
Little River						8		15,250	13,979,720					
French Broad River						29		482,820	112,312,680					
Nolichucky River						66		230,070	97,110,709					
Pigeon River						14		62,570	26,208,355					
Holston River						35		311,470	94,420,800					
Totals						302		2,202,840	$704,973,347					

* Including transmission.

plants dotted throughout the southeastern load area. In general, these plants were either close to existing load areas or else load areas have been built up around them because of favorable conditions of topography, labor, taxes, transportation, markets, etc. Bulk transmission distances are relatively short, although there are many tie lines interconnecting steam and hydro systems for diversity, reserve and continuity of service. Messrs. Yates, Longley and Barry in talking about steam versus hydro costs before the House committee took $70 to $75 or even less per kilowatt for the cost of steam capacity and $1.60 for a ton of coal as characteristic current values. Of course, many of the existing steam plants are small and were built before the present price era and consequently represent unit outlays higher than these values. Hydro costs, variable of course, were put by Mr. Barry at $160 per kilowatt "as not speculative as far as our Alabama system is concerned."

Load-center steam is cheaper

How about power costs? The army engineers estimated switchboard costs ranging from 3.51 to 4.33 mills per kilowatt-hour, depending upon the extent of the valley development and the degree to which steam auxiliary and marginal high-cost developments are included. For transmission to the load centers they estimated 2.322 mills for 200-mile radii and 2.785 mills for 350-mile radii. The delivered energy cost, before local distribution costs are considered, falls, therefore, within the range of 5.83 to 6.65 mills at 200 miles and within the range of 6.30 to 7.12 mills at 350 miles. Stacked against these figures is the actual cost of generation of 3.6 mills at the switchboard, including all charges and expenses, of the 60,000-kw. steam plant at Atlanta, a plant which cost a trifle over $70 per kilowatt. Coal cost was $2.50 per ton.

The average rate for all output, domestic, commercial and industrial, was 1.95 cents, compared with a national average of 2.87 cents. The Southeast now has low power rates and there can hardly be said to exist any provocation for the government to spend a billion dollars to accomplish this objective. The average retail or domestic rate is 5.46 cents, compared with the national figure of 5.58. A rate of 1½ cents per kilowatt-hour is available in Alabama and about 2 cents in most of the homes in the rest of the territory for range and water-heating purposes; in fact, for any usage above 200 kw.-hr. per month.

Confining the comparison for the moment to the power rates, it is evident that the margin between competitive power delivered from government plants over government transmission lines and the present private utility rates would be slim, negligible, non-existent or negative. So slim in most cases as to leave no differential to cover terminal costs, distribution and administration of the retailing enterprise.

In testifying a few days ago before the House committee on military affairs Vice-President J. A. Longley of Tennessee Electric Power submitted the data in Table IV for domestic usage. The busbar costs in those figures are comparable to the ranges estimated for government generation. Vice-President Barry of Alabama Power stated that the average domestic rate of municipal plants was 6.26 cents for power purchased from the Alabama Power Company at an average of 1.3 cents. The differential of 4.96 cents covers the same items (except taxes), for which Mr. Longley allowed 3.9 cents in his 591 kw.-hr.-per-year set-up for domestic usage.

Manifestly the provocation to induce lower electric rates in the Southeast by a huge subsidy from the federal treasury is a puerile one. The government's own estimates of ultimate Tennessee Valley power delivered over the territory are as great as or in excess of those now being charged. Also, if the objective is to encour-

age municipal ventures the present rates charged by the municipal systems are higher than the corresponding average rates charged to the Commonwealth & Southern system's domestic customers even though the municipals buy at wholesale rates lower than those paid by many large industrial plants in the same territory.

Success of the venture is wholly problematical

What conclusions can be drawn from the facts? One dominant fact obscuring all others is that the whole proposal is the most enormous one so far advanced to precipitate the country into the noble experiment of a "balanced socialistic and communistic economy." It had not succeeded in the halls of Congress while the country remained wedded to the concepts of the forefathers. But in the rush to concoct a new nationalism it moves to fruition as one of the passes of a groggy and blinded boxer trying to land at a vulnerable spot on an intangible and imaginary adversary. The ultimate consequences of winning or losing are as nothing compared with the applause from the galleries. But the nation's taxpayers are privileged to try anything once, and there is no profit in bucking the tide of popular opinion no matter how deluded it may be. The delusions are exposed by a calmer study of the true facts showing costs and returns to taxpayers.

Table II—Billion Dollar Plan Promises 4⅓-Mill Power at Generating Station Buses

	System A (Initial)	System B (Ultimate)
Capacities		
Potential storage (kilowatt-years)	135,951	1,250,870
Total hydro installations (kilowatts)	1,172,200	5,229,800
Total steam installations (kilowatts)	289,200	773,200
Total installations at 50 per cent load factor (kilowatts)	1,461,400	6,002,800
Estimated Capital Costs		
Steam auxiliary	$28,920,000	$77,300,000
Hydro above base in lieu of steam	29,969,300	170,950,400
Hydro plant and installations to base	146,376,000	931,754,800
Totals	$176,345,300	$1,102,704,800
Production Costs	(Mills per Kilowatt-Hour)	
Hydro natural to base	2.74	2.49
Additional output due to storage regulation	3.33	3.09
Auxiliary steam output by storage regulation	=3.40	=5.00
Total cost of storage output and regulation	4.89	6.09
Total cost of hydro production	3.07	4.15
Cost of auxiliary steam	5.78	6.11
Total cost of hydro-steam power	3.51	4.33

Table III—Average Industrial Power Rates in Southeast Area

Industry	Average Kilowatt Demand	Average Kw.-Hr. per Year	Average Load Factor (per Cent)	Average Rate per Kw.-Hr. (Cents)
Cement plants	3,450	11,700,000	38.6	0.91
Coal mines	465	1,250,000	30.7	1.29
Cotton oil, fertilizer	260	430,000	18.9	1.38
Electrochemical	18,840	93,000,000	56.0	0.41*
Foundries, machine shops	200	370,000	21.0	1.76
Ice plants	110	400,000	41.5	1.23
Ore mines	800	1,050,000	15.0	1.48
Quarries	265	540,600	18.9	1.70
Steel plants	11,000	11,000,600	11.4	1.43
Textile mills	970	3,200,000	37.6	1.00
Water works	125	385,000	35.0	1.22
Large wholesale utility	42,000	198,000,000	53.7	0.69
Other utilities	460	1,435,000	35.5	1.27

* The bulk of this energy is dump power at a 3-mill rate.

Table IV—Quadrupled Use Would Cut Domestic Energy Costs by 60 per Cent

(Submitted in testimony of Vice-President Longley of Tennessee Electric Power Company before House committee on military affairs, April 13, 1933)

	For Annual Consumption of 591 Kw.-Hr. (cents)	For Annual Consumption of 2,000 Kw.-Hr. (cents)
Average cost per kw.-hr. at busbar in generating stations (including fixed charges)	0.72	0.55
Cost per kw.-hr. for transmission from busbar to city gate (including fixed charges and losses)	0.59	0.34
Investment per customer (estimated)	$100.00	$126.00
Carrying charges at 11.5 per cent	$11.50	$14.50
Operating costs per customer	$12.08	$12.08
Total	$23.58	$26.58
Cost of distribution per kw.-hr.	3.90	1.33
Total cost per kw.-hr.	5.30	2.22

Facts largely obscured by the political obsession are simply the following:

Appropriations starting with $50,000,000 and ending with twenty times that amount are to be made to develop power which will not be needed within two decades unless power consumption far exceeds the rosiest estimates of the past.

Superior economy of steam power at load centers versus marginal hydro at remote transmission points is entirely flouted.

Technical recognition of the economic fallacy in attempting to propel enormous blocks of energy to great distances is ignored by the government after it has been accepted by the technical minds of the power industry.

Hydro plants, more than a hundred of them, are contemplated in a region where for purely economic reasons hardly a half dozen additional plants would be undertaken by private enterprise.

The potential outputs are far in excess of any likely demand unless

(a) Domestic consumption can be built up promptly to a quadrupled quadrupling of its present magnitude, or

(b) fertilizer output can be absorbed at a rate that no balanced agricultural economy can justify, or

(c) explosives can be burned up in a multitude of fortuitous wars that every one is trying to prevent, or

(d) some at present unforeseen demand for electrical energy by huge electrochemical or electrometallurgical industries can be fostered at a rapid rate, or

(e) present utility systems and the huge investments of the nation's savings in them are to be wholly destroyed by subsidized competitive assault.

▼

Only Very Light Loads Justify Open Delta for Loss Reduction

At a few locations on the system of the Public Service Company of Northern Illinois loss reduction is being accomplished by temporary operation in open delta of transformer banks which are at present very lightly loaded. But the only saving of the open delta is in the iron loss and maintenance of the disconnected transformer. In transformers of modern design the iron loss is small in comparison with the full load copper loss. This fact necessitates a very light load before open-delta operation is economical.

Considering the transformer bank only, the ratio of root-mean-square kva. load to transformer capacity must be less than one-third to justify change to open delta. This ratio, expressed in the equation:

$$\frac{\text{Load in kva. (root-mean-square)}}{\text{Capacity of closed delta}} = \sqrt{\frac{\text{Iron loss of one transformer}}{3 \times \text{full load copper loss of one transformer}}}$$

is developed from the relation:

$$3\,L^2R = 1$$

presented as the equation of equal losses in delta and open-delta connections by L. M. Grow in the article "Closed Delta May Be More Economical than Open," on page 827 of ELECTRICAL WORLD, May 7, 1932. (L is the loss factor and R the ratio of full load copper loss to core loss.)

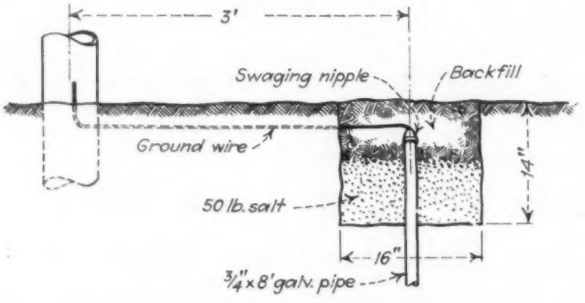
But transformer losses are not all that must be considered. Open-delta connections are accompanied by increased losses in feeders and substation transformers caused by load unbalance. This is particularly true when the transformers are fed from a four-wire distribution system and connected in star on the primary. Also the labor cost of opening and later closing the delta must be taken into account. Because of these supplementary considerations the root-mean-square load on the closed delta bank must be materially less than one-third of the closed delta capacity to justify the change to open delta.

▼

Rural Line Grounds Must Be Good Grounds

By R. H. PARRISH
San Antonio, Tex.

Lightning protection by the shielding effect of adjacent buildings, tall structures, other poles, etc., is in general lacking from rural lines. Also, remote locations often prevent adequate and frequent inspections of ground resistances. These considerations of greater exposure and difficult inspection make it quite imperative



Simple and effective rural line ground

that lightning arrester grounds on rural lines be as good as they can be made when initially established. A type of ground found effective for rural lines is shown in the accompanying sketch. The body of the ground is approximately 50 lb. of coarse salt placed 3 ft. from the pole. This distance should not be less because the current carrying area around the ground pipe would thus be diminished by the pole. Galvanized iron pipe, size ¾ in., approximately 8 ft. long, to which the grounding wire is attached by means of a self-swaging cap, is used. Grounds made in this fashion in sandy or otherwise loose soil have effective resistances of from 15 to 20 ohms, after they have reached maximum effectiveness, which will be from two to ten months. The effective life will be from two to three years, whereas in dense, hard soil the life may be expected to be much more.

▼

Effectiveness of Flue-Gas Cleaners

One measure of the effectiveness of flue-gas dust-removal apparatus was given for a specific installation by H. E. Wallsom before a joint meeting of the Institute of Fuel and Society of Chemical Industry at Bristol University (England) recently. Reference was made to a combined centrifugal collector and gas-washing apparatus at the Derby Corporation power station and was based on the ash content of the raw coal burned.

The figures reported by him, according to J. B. C. Kershaw, were as follows:

Coal consumed (tons)	594
Average ash contents (per cent)	20.5
Total free ash (tons)	120.77
Average combustible matter in ash (per cent)	7.38
Total ash (tons)	130.4

The grit collected in the cleaning plant was as follows:

	Tons
Ash chambers	27.8
Centrifugal collectors	52.0
Boiler passes and flues	2.3
Gas washers	40.1
Unaccounted for	8.2

Using the above data, he reaches the conclusion that the efficiency of the dust collectors was 50.7 per cent; the efficiency of the gas washers, 83.0 per cent, and the combined efficiency of this gas-cleaning plant 93.7 per cent.

The dust collected by the combined system was subjected to screening and elutriation, with the following results:

Mesh (I. M. M.)	Dust Collectors, Per Cent	Gas Washers, Per Cent
Over 40	0.43	Nil
Through 40	99.57	100.00
100	89.16	92.93
200	49.68	80.99
300	.....	72.42
600	18.75	50.12
1,000	14.94	47.52

Electro-filters, however, have some inherent disadvantages, the chief of which are the following:

1. A decreasing efficiency with increasing load; that is, with increasing dust concentration, particularly noticeable during soot-blowing periods.

2. Electro-filters are unable to remove sulphur compounds unless these are present in the form of SO_3.

3. The initial cost of electro-filters is high, sometimes being as much as 25 per cent of the cost of the boilers and 4 per cent of the cost of the whole power station. A further disadvantage is the space they occupy, which is very considerable, and in some instances their dimensions may be the same as the boilers which they serve.

4. The cost of disposing of the dust, which is in an extremely divided state, may be excessive unless a market can be found or developed for the same.

Production for Profits

By D. R. STEVENS
Vice-President Okonite Company

Unbridled competition brings excessive unemployment.
Factory managers are not enslaved by machinery.
Buying on specifications.
Patent protection limited.

ASSUMING that the great American public is sick of economic theories for the time being and wants to start the unemployed back to work, I propose to explain what has caused me to be enslaved for 21 years to the essential objective of getting rid of men. And having shown that, then I can show what can be done to turn our factory managers' minds into other channels of thought. If that is done men will find their way back into industry because it will no longer be fashionable to get rid of men. An American surge will come in some other direction. Factory managers will have to be "successful' and "smart" in some new line. The number of men they employ will be as secondary a matter as is the case today with research activity. Of course this could not happen overnight.

Why should a factory manager of three tiny plants presume to make this explanation? Well, factory managers (large or small) are not given to talking or writing for the public, and I have not heard any one else in the chain gang make our condition articulate. It is a duty for some one of us to do this job. We are the men who have been executive in this presently overdone idea of labor saving. As long as no one else has spoken I will. But I will speak only in language with which I am familiar. I will not speak in the language of economics nor will I attempt to satisfy the economists.

We hired factory managers are not enslaved by machinery, we are not enslaved by capital. We are enslaved by the great American public, 10,000,000 to 15,000,000 of whom are now presumed to be out of work. I *should* say we are enslaved by the public of 30 years ago. The present public can strike off our fetters, can change our thinking, can start the fashion for reemployment, can decelerate the craze for labor-saving machinery. It is plain to every one what a muddle has been caused by prohibition and veterans' aid. It seems not to be plain to any one what a muddle has been caused by *unbridled competition*.

The great American public of thirty years ago cheered for Teddy and the big stick and enacted the Sherman anti-trust laws. The public thus said:

1. "Thou shalt not monopolize."
2. "Thou shalt compete!"

The public breathed easier. Was that sound economics?

I graduated from high school in the panic of 1907 and didn't know there was a panic. I went to Massachusetts Institute of Technology, graduated in 1911 and immediately became engaged in the factory of one of America's finest motor cars. Five or six cars a day was a good business and occupied a large force of men and large shops. Those cars sold for $5,000, $6,000 and $7,000.

By 1913 things weren't going very well. *Competition* was keen. Frederick W. Taylor's discoveries in scientific management and Mr. Ford's development of continuous production had shown the public that piece-worked fingers were nimble and that pacing a man's activities in return for high wages produced fair cars at cheap prices. My employer closed down the finest machine shop in the city and laid off all the machinists. In desperation my company scrapped its established policies, gave up quality car building and scrambled into the *competitive* field with a hastily designed "assembled car." That company never regained its prestige.

In 1915 I was invited to the factory staff of a great tire company. I left my employees and friends in the motor company with great regret. The tire company had *profits* pouring out as though from a pump and by the time America was in the war I was advertising in every town in the United States of more than 10,000 population, not only for men but for women. Our "efficiency" was terrible, but who cared?—the specter of *competition* was absent. The Sherman anti-trust laws bothered no one because this was a seller's market.

And so it remained even after the armistice until industry surged into the climax of 1920 and woke up trembling in 1921 at the nightmare of a buyers' strike.

That was the last of the "lush" days for labor. That was the last time that factory managers were allowed to let their minds off of studying how to eliminate labor.

My company was in dire straits. Bankers roamed all over the place. Labor suddenly became three times as efficient. Those let out went into the streets. I personally laid off one group of 75 white collar men in one day from one office department, many of them college and technical men whom I had carefully recruited with well-intentioned promises as to their future. I have never since made promises.

In the turmoil I was unhappy. At the worst point of the depression I offered to relieve my employer of my modest overhead if he would give me a little time to try for a new connection. My old motor company friends were also in trouble. I became superintendent of the small factory of one of the oldest insulated wire and cable companies in America.

Coming from a plant of 25,000 employees to one of 400 was quite a change. For about 24 hours I was a bit

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In a series of three articles Mr. Stevens discusses present business conditions from the point of view of a factory manager. His personal experiences and his intelligent comments are worthy of serious study by the industry. These articles are contributed as a part of the editorial program of "Electrical World" to render constructive aid to the electrical industry in meeting new conditions.—EDITORS.

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at sea. That was all. In 24 hours I found out that *this* company wouldn't survive unless I overhauled the factory and factory organization from stem to stern so that it might *compete.*

This was a *buyers'* market and the ghost of Teddy's big stick was working overtime in behalf of the buyers. Those Sherman anti-trust laws were saying again: "Thou shalt compete." I said to myself I'll show our competitors a few tricks. And a thousand other factory managers said the same thing to themselves. From 1921 to 1933 we factory managers have ceaselessly worked to get rid of labor—all enslaved in the same chain gang, all driven by a law passed when many of us were in knee pants—"Thou shalt compete."

The 1921 depression was short-lived. I'll not pretend to explain why. Then we had a queer era—wild prosperity of a sort, sometimes called profitless prosperity.

I glorified in my ability to help keep my company out in front. I cleaned out complicated control systems; I eliminated forms and clerical work; I straightened out aisles and moved machinery around; I cut new doors here and tore down old partitions there. I established bonuses for the foremen and bonuses for the men. I developed a real spirit and zeal to get a lot done for a little cost. I did all this and more with very little money. I was *saving* money. I was getting rid of men, and enjoyed it because I was improving conditions and earnings for every one. But please note, I was not enslaved by any machinery. As time went on the owners encouraged me to make capital outlays. I bought some new machinery and it did reduce the labor charge. But most of my labor savings had been previously made by using my head and without new machinery. I bought this machinery to have better equipment, to get better quality and to handle bigger jobs. My employers wanted to keep their plant out in front. They insisted on having fine equipment to undertake and anticipate the highest demands of the American market. We always have done just that.

In 1925 my employers decided on quality competition in another line. I put together for them the most efficient cable plant in America—probably in the world. Scarcely a machine operated with more than one man. Cranes overhead in every department. Aisles that you could drive a Mack truck through. Thus my company employed more men. But we captured a large part of the market from the start. My 100 new employees may have displaced 200 in competitors' older plants. My employers' quality reputation captured that market, not my skill in putting the new plant together. I didn't really get that fine machinery to be a labor saver. I got it to be ready for what might be wanted for cables then undreamed of. The dreams have since occurred and become realities.

In 1928 we absorbed another old-established company—one that had gone to seed because the second generation of owners had been unsuccessful in learning how to live with those Sherman anti-trust laws.

That plant was nearly a scrap heap. I begged to be allowed to start all over again in an open meadow. We ended up by reclaiming the derelict. Even now none but those who work there every day can find their way around in it. But by the time we got through cutting doors and installing aisles and getting a few hoists and other simplified systems we had as competitive a plant of its type as we needed and we proceeded to reclaim markets that that second generation had lost. We pushed their 18-lb.-per-man-hour up to 50 from 1928 to 1933. We had a lot of fun; never put in but one of our own men to supervise the plant, never dispossessed any good men from their old jobs. But how we shed the inefficient and unnecessary. The community praised us. We brought new life to a dying factory. The men made more money than before—we were all happy. And we didn't do half of it with labor-saving machinery. That plant has made *competition* keener all over the industry.

Profitless prosperity came from competition

There was just one cloud on the horizon through all the 1921-1933 period. The sales manager kept coming to me and saying, "I've had to shade prices to get orders," or "I took that order at a loss to fill up the plant," or "So and so has cut under our quotation by 5, 10 or 20 per cent." And then invariably, "See what you can do in the factory to save something and make a *profit.*" That's what all of us factory managers were hearing. We heard about and saw "profitless prosperity."

We couldn't cut costs by miracles. We were driven to get rid of men. Was the machinery our taskmaster, our Frankenstein? It was not. It wasn't used half as much for labor saving as our present expounders of despair would have you believe. We just used our heads.

Was the sales manager the slave driver then? Well, he was in a chain gang of his own. I used to ask him the cause of all his difficulties. Most always the answer was "purchasing agents—purchasing agents who were growing more and more skillful with 30 years' practice, more and more powerful with consolidations and growth of big corporations.

I used to say: "Why don't you organize our competitors to resist this folly of *competitive* suicide?" He said: "The Sherman anti-trust laws would put us in jail" "Is there no law for curbing the purchasing agents?" I asked. "None. They can combine power in growing amalgamations and there is no law to reach them," he answered. "And the little ones copy the big ones" "Let me talk to one," I suggested.

Our general manager is a courageous man. At the risk of antagonizing a big buyer he gave me *carte blanche* to talk to just one of the most skillful buyers. I said to that man: "Whenever you force any salesman to take an order below cost you force a factory manager to get rid of men. Thousands of salesmen are taking orders below cost because you purchasing agents give them no alternative. Thousands of factory managers are getting rid of men. These men are your market, your clients, your buyers. We are suffering now. You will suffer in the end. You will stop employment, ruin quality, demoralize honesty, threaten progress."

"Mr. Stevens," he said, "I have a stewardship. I use specifications set by our engineering department that establish a standard of quality. I then buy at the lowest price, and that is my duty to my company. I dont want to buy at ruinous prices. It's not my fault if I do. Why don't you manufacturers get together?" "You know that the Sherman anti-trust laws would put us in jail if we did," I answered, "And you purchasing agents would be the ones to jail us—so as not to restrict your freedom of action. You would be the principal objectors." That was about 1924. By a miracle we continued to maintain business relations. I learned, as the years went by, that the purchasing agents who enslaved the sales managers were themselves enslaved. They never thought about the effect of buying below cost from *their own* sales managers.

One of their greatest offensive weapons was the specification. And the preparation of specification goes back to engineers, men of the same training as myself, few of them ever educated at school to a vision of simplicity and balance. Most of them were bent on doing things the hard way, the *technical* way, the bureaucratic way. Most of them were uplifted in the thought that specification writing induced high-minded ideas on quality among the manufacturers. None of them realized that specifications are only commandments for a minimum standard. Even the Ten Commandments are minimum standards.

My company adopted as its slogan, "You Cannot Write Quality Into a Specification." Our steady campaign was of little effect. All over the country the chain gang of factory managers was studying specifications, stultifying their better natures trying to see how cheap they could make things without getting caught, and all of the time getting rid of men. And engineers and purchasing agents were digging their own graves. Because when we factory managers got enough we hollered, "Lay off the factory. Cut down the staff for a change!" And out went the white collar men.

So perhaps, then, it was brother against brother. The engineers were our tyrants? No, no, no. We are getting nearer to the source, however.

The engineers and purchasing agents all worked for general managers. General managers all had purchasing agents to buy cheap and sales managers to sell dear. Both had to be smart to survive. Smartness dulled ethics. The general managers gave very little guidance to their purchasing agents and put a lot of pressure on their sales managers. As long as the general managers kept out of the red they gave little thought to the fact that they were "sowing the wind to reap the whirlwind." How could they be expected to think this? These busy captains of industry were being told by college professors, economists and all great minds that everything was all right, the new era was here and the policies producing it were sound. No wonder that the still small voice of one little factory manager made no impression on the purchasing agent of a great corporation endowed with the finest leadership that a big salary could buy.

Surely by now we have arrived at the source. The general manager, that tool of the capitalist, has enslaved us all! If it isn't the machine, nor the factory manager, nor the sales manager, nor the purchasing agent, nor the engineer, it can be no one else than the general managers of these great corporations. All wrong again!

I have brought you to view through a factory manager's eyes an industrial civil war with brother pitted against brother, and at the moment the purchasing agents have emerged victorious, the sales managers are cowering in horror, the factory managers are enslaved, the engineers are duped, the general managers are impotent. All around lie the wounded and bleeding bodies of the unemployed. The purchasing agent *was* victorious, but only for a moment. His firm has no market, his sales manager can not sell the dead and dying. Yet I have said it is not the fault of the purchasing agent.

The fault of the old law

We are living *today*—not *tomorrow*—in a condition where there is neither "price nor profit." And the cause of all this is the law enacted by the people of Teddy's day—law which said "Thou shalt compete." From that day to this the effect of that law has been gathering momentum. Its effect was obscured during the war period. Take the war period out and it is very plain to a factory manager that with accelerating pace he has been enslaved to the law that to *compete* he must get rid of men.

If Teddy were here today I think he would see the trouble. He was a man. He would not permit a law of one period to enslave and pauperize the people of another. His big stick was always ready to wield in defence of the people. Whether it was economic to pass those Sherman laws in his day I don't know and I don't believe he cared. He was out to defend the little man. Today every little man is a purchasing agent, every housewife is a purchasing agent. With no dependable income available, each is wildly hunting for the lowest bargain, and thus inexorably continuing to put more brothers and sisters out of work. The *law* is the Frankenstein—not the machine. Machinery will never master man. It is easy to show that. But man's laws have mastered man for the moment, just as plainly as though he had said to himself, "Thou shalt not eat."

Nature is never in balance. But nature sets up correctives against all evils. Americans will get back into better balance some day. They may not stand for monopoly. But they will eliminate the suicide pact. My objective is to persuade them to do it now.

The cost of unbridled competition is excessive unemployment.

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Losses Caused by Needlessly High Bus Voltages

As a part in a general study to reduce losses on the system of the Public Service Company of Northern Illinois attention was directed to substation bus voltages. In a number of cases they were found to be higher than the voltage ratings of connected equipments. If a transformer is 10 per cent overmagnetized an additional loss of from 15 to 20 per cent may occur. This applies also to induction regulators. Excess voltage causes excessive exciting or wattless current and extra loss in the transmission system as well. In those cases where there was sufficient leeway in regulation the voltage was lowered and a saving effected, as shown in table below.

Savings Effected by Lowering Bus Voltages

Transformer Capacity	4-Kv. Bus Voltage Lowered %	Kw. Loss Reduction	R-Kva. Wattless Reduction	Hours per Year Effective	Yearly Kw.-Hr. Saved
10,000	5	3.8	38.4	8,760	33,300
5,000	5	4.2	31.4	5,840	24,600
2,000	5	1.9	16.1	8,760	16,700
10,000	5	3.1	30.8	8,760	27,200
3,000	5	2.3	19.2	8,760	20,200
10,000	5	4.1	37.0	8,760	35,900
3,000	5	2.5	25.2	8,760	21,900
7,500	5	5.3	50.5	5,840	31,000
3,000	7.5	10.1	259.4	8,760	88,500
10,000	5	3.8	36.7	8,760	33,300
10,000	5	3.9	36.4	8,760	34,200
10,000	5	4.2	33.1	8,760	36,800
10,000	5	3.6	30.8	8,760	31,500
10,000	5	4.4	40.6	5,840	25,800
2,500	5	2.0	16.2	8,760	17,500
1,500	5	1.3	11.2	8,760	11,400
2,500	5	2.0	16.2	8,760	17,500
5,000	2.5	1.8	14.5	8,760	15,400
5,000	5	3.6	30.8	8,760	31,500
120,000		67.9	776.5		554,200

Philadelphia's Experience in Co-operation

An appraisal of what has been accomplished by organized co-ordination in marketing.

By EARL WHITEHORNE

NO DEVELOPMENT in the marketing activities of the electrical industry has occasioned more interest and comment in the last few years than the rise of organized co-operation in the city of Philadelphia. The idea of a local league or association to unite the efforts of the electrical men of a community is not new. It has been slowly evolving for a long while and there have been many such organizations operating in large and small towns, with varying scope and success. But the Philadelphia experience has attracted unusual attention. And electrical men about the country are wondering just what value it has proved to the local industry and what guidance it offers to other cities.

To understand the Philadelphia situation it is necessary to know something of the background of trade relations in that legendary center of brotherly love. For it is the preface to every man's testimony who discusses the improved conditions there. In the first place the Philadelphia Electric Company until recently has given free lamp renewals, which has been unpopular with dealers, contractors and wholesalers. For many years, also, it maintained a so-called supply department, a jobbing house in direct competition with the wholesaler, and through it bought its own supplies. For a time it operated a contracting department that installed house wiring. Also, the company has been an aggressive merchandiser of domestic appliances and for a period engaged in high-pressure house-to-house selling, backed by vigorous advertising of the mail order type, in which the emphasis was placed on price.

All this built up many grievances in the trade over twenty years or more. Many were real and many were imagined. But naturally it engendered a spirit of antagonism toward the utility company and an exasperation in the personnel of the power company toward the complaints and opposition of the trade. There are plenty of opportunities for misunderstanding in every community between the utility company and the other branches of the local electrical industry, but these conditions in Philadelphia continually fed fuel to discord and it was a hot spot.

But a few years ago there was a change in management of the Philadelphia Electric Company and all these conditions began to be combed out. It was recognized that the support and co-operation of the trade was of great potential value in the building of load and the improvement and protection of public relations, and that if this support was to be expected, the trade was entitled to equal support and co-operation from the utility company. So merchandising methods were brought into line with sound trade practice. Wiring had already been abandoned. The supply department was amputated. And more recently free lamp renewals have been discontinued. These readjustments were very concrete evidences of a new policy that manifested itself in a general change of attitude toward the trade. The progress of organized co-operation has sprung from this background and the change to the situation of today is dramatic in its contrast.

Early efforts

The effort to bring harmony to the electrical family of Philadelphia dates back some fifteen years, when the Electric Club was formed. It was a luncheon club that brought the group together once a month. Six years later it was decided to branch out into promotion work and an industrial lighting campaign was organized. Then on five occasions a "Home Electric" was staged, one of them at the Sesqui-Centennial Exposition. Finally, in 1928, an Electric and Radio Show was held, an elaborate affair that cost $42,000. And this was a good thing, because it provided an emergency around which the local industry rallied and found the way to work together. For it had finished the year with a deficit of $25,000 and something had to be done about it.

Well, the first thing that was done was to hire a man to run the club who was a real manager, with a keen sense of promotion. His name was George R. Conover. One of the first things he did was to go after the vice-president and general manager of the Philadelphia Electric Company, Horace P. Liversidge, and get him to become active in the club. Mr. Liversidge was only interested if they would turn it into a business-building organization, an association with a progressive development program. So they launched the Electrical Association of Philadelphia and Mr. Liversidge went on the board of directors and became vice-chairman of the show committee and got to work with them to help put co-operation on its feet.

That was the turning point. The active, enthusiastic participation of the general manager of the power company, plus a responsible director for the organization itself, began to show results. Mr. Conover was in charge with the advice and support of committees, but decisions did not wait on postponed meetings. A membership was built up and the Philadelphia Electric Company had two votes on the board, like the other branches of the industry. Mr. Liversidge was violently opposed to power company domination and the company men came in on that basis.

Expanding activities

During the year 1929 the association held a Refrigeration Show, the first one in the country, attended by 19,000 people, who bought 97 refrigerators off the floor and provided hundreds of live leads. Exhibitors had to be members of the association and they came out of the show with an organized refrigeration division. They conducted a lighting school in which 340 were registered.

They celebrated Light's Golden Jubilee with floodlighting, parades, etc. They established a "red seal" wiring service that in six months made 360 awards, adding 3,987 outlets to installations and netting the industry $59,800 in extra business and began the gradual improvement of local wiring standards. They ran an industrial and commercial lighting campaign and a Christmas lighting campaign. They started an electrical news service. They increased the social activities to include weekly luncheons, an annual banquet, a golf tournament and a picnic. And they held another Electric and Radio Show, with 550 companies exhibiting. It showed a profit and at the end of the year the deficit was paid and there was money in the bank.

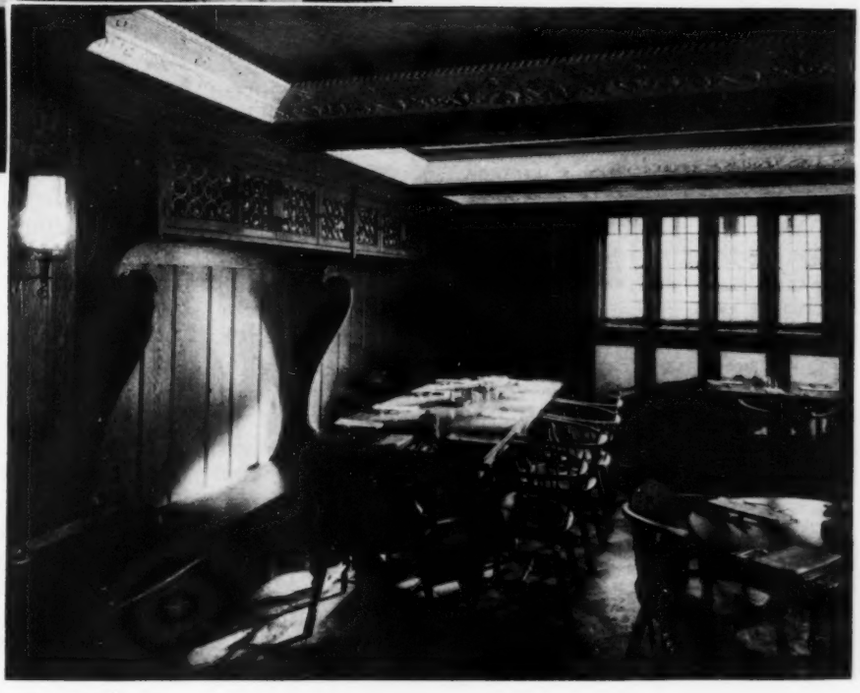
In 1930 the Refrigeration Show registered 25,000 attendance, 9,000 prospects and 150 units sold. The Electric and Radio Show drew 125,000 attendance and paid a profit. There were 1,097 red seal awards, with an active promotion of equipment to these houses. There were industrial lighting, Christmas lighting and Christmas gift campaigns, and the publicity and social activities continued. In addition the electrical maintenance engineers were organized as an affiliated group, a speakers' bureau was established and some model electric home demonstrations were held. Liversidge was vice-president of the association that year.

In 1931 the Refrigeration Show sold 171 units and produced 3,500 prospects. Red seal made 849 awards. The Electric and Radio Show drew 100,000 people. A refrigeration sales campaign was added to the program, also a radio trade show and a portable appliance week

Last year the association spent $18,000 in newspaper advertising to support refrigeration sales. This is a good example

Portrait of a lady
Preparing a Meal for Four!
Miles away from the kitchen—keeping young—getting the most out of life. Yet within the hour—a gracious hostess, presiding over a perfect meal prepared by her own hands.
"How do you do it without servants?" ask her guests as they compliment the perfection of the roast, the palate-tempting delicacy of every item of the menu.
Thousands of modern women know the answer—"Electric Cooking." Thousands of women will tell you that an electric range means less time in the kitchen—quicker, cleaner, easier cooking—and assures perfect results for even the most complicated recipes.
Every woman is entitled to enjoy this new freedom from kitchen captivity. Now—every woman can.
Know the facts! Electric cooking costs no more than any other method. A few cents a day for the average family.
$5 Down will buy a modern
ELECTRIC RANGE
—then pay the balance, in convenient amounts. Installation is FREE for most home kitchen locations.
Go to your nearest dealer today. Inspect the latest models of modern electric ranges. You will be amazed to discover that an electric range is easy to own, economical to operate.
At your nearest dealer—or phone RITtenhouse 7771
The
ELECTRICAL ASSOCIATION
of PHILADELPHIA
Visit the Modern Electrical Exhibit at the Association's Headquarters, Architects Building, 17th and Sansom Streets. Open Daily

A corner in the dining room of the electric home at association headquarters. It is not just a display. You walk right in and sit down



The dining room in the Electrical Institute has played an important part in the work by bringing men together in a comfortable club atmosphere

campaign. Christmas gift and Christmas lighting campaigns were held as before. A bowling team was added to the social program. The big event of the year, however, was the opening of a new headquarters occupying two floors of the new Architects Building, which provided offices, a dining room and an elaborate lighting and appliance exhibit, with a model home and a model store. But the most important contribution to the progress of co-operation in Philadelphia was an electric range campaign.

Launching the range

The Philadelphia Electric Company is owned by the United Gas Improvement Company and up to that time had been opposed to the promotion of ranges. There was no rate. There were no dealers. There were no distributors. Liversidge had succeeded to the presidncy of the association this year. Conover put it up to him that the industry was entitled to develop this market in Philadelphia as well as elsewhere. He told Conover to visit other cities, study the situation and make a recommendation. Conover did, and then brought the range manufacturers together and they approved the plan. It was submitted to the Philadelphia Electric Company and W. H. Taylor, the president of the company, said: "We'll try it out."

The campaign was launched in March at a dinner of 526 dealers, distributors and power company men. The quota was 5,000 ranges. The Philadelphia Electric Company agreed to pay the cost of wiring and finance installment contracts. A range exhibit was set up at headquarters. Home demonstrators were provided. Two cooking schools were sponsored by two local newspapers, with an attendance of 2,000 women. There was a range school for dealers and salesmen—newspaper and outdoor advertising—radio broadcasts. Ranges were bought by 89 dealers who had never sold them before. The quota of 5,000 was exceeded. About $750,000 worth of ranges were marketed and $250,000 worth of wiring. Manufacturers, distributors and retailers had had a demonstration of the practical value of co-operative market development that opened their eyes. And the power company had a new load that was very worth while.

Meanwhile, the well-known depression was progressing, but the Electrical Association of Philadelphia was apparently too busy to bother with it. In 1932 the program was further expanded. More than $50,000 worth of units were sold at the Refrigeration Show and $25,000 worth in the follow-up. There were 200 booths in the Electrical and Radio Show and 60,000 attendance. Red seal made 403 awards. There was a fall cooking campaign, tied into the national program. There were campaigns on refrigeration, Christmas gifts and lighting and another range campaign, in which more than 100 dealers sold a total of 645 ranges. A drive was made to get dealers to use electric ranges at home and to have connected ranges in their stores. Those who cooked electrically at home averaged 5.4 sales, compared with 1.6 by those who did not. Those with ranges operating in the store averaged nine sales against two for those who only made "cold demonstrations." In addition there was a water-heater campaign that sold 423 units, although practically none had been sold in former years.

There were other innovations last year. A contractors' clearing house was established, under a committee composed of contractors, with members representing the manufacturing, wholesaling, utility and underwriters' inspection interests. Its function is to work out the problems of the industrial electrical contractors as related to the power company, manufacturers and jobbers and to distribute equitably business leads received from the Philadelphia Electric Company. On isolated plant cases three contractors and two manufacturers are assigned to the job, and in cases where the customer is being penalized for bad power factor three contractors go to work on the customer.

A comparison of range sales in 1931, with a spring campaign, and 1932, with the drive in the fall

A retail merchandising service was set up that provides a uniform accounting system to members and assists in setting up proper cost keeping. It also provides model contract forms for hiring salesmen and other similar aid. Also, 26 manufacturers of wiring materials and equipment held a trade show attended by 1,000 contractors, dealers, jobbers, plant electricians and engineers. And at the close of the year the award to Horace Liversidge of the James H. McGraw Medal for Co-operation was made the occasion of a co-operation banquet attended by more than 600 people, at which the presidents of the four national associations of the industry paid tribute to the work that has been done in Philadelphia.

Meanwhile twenty outside organizations of interest to the electrical industry have become affiliated with the Philadelphia Electrical Association and are meeting regularly at its headquarters. They are such groups as the local construction industry, building owners and managers, the Producers' Council, American Institute of Architects, Philadelphia Trade Executives, the industrial engineers, illuminating engineers and Sash and Door Association. The field of influence of the Electrical Association has also been extended to embrace the electrical industry in Bucks, Montgomery, Delaware and Chester Counties, where separate sections meet locally.

While it is obviously impossible to tabulate the results

Electric Refrigeration Sales for 1931 and 1932

A month-by-month analysis of refrigeration sales from which each distributor plots his own position in the trade. Reports cover Philadelphia and Bucks, Montgomery, Delaware and Chester Counties, but include sales by members only.

Month	1932 Total Units Sold	1931 Total Units Sold	1932 % Inc. or Dec.	1932 Retail Value Dollars	1931 Retail Value Dollars	1932 % Inc. or Dec.	Average Unit Price 1932	Average Unit Price 1931
January....	1545	917	+68	$340,083	$230,740	+47	$220	$252
February...	1711	992	+72	373,115	253,783	+47	218	256
March.....	2365	2545	— 7	520,221	645,179	—19	220	254
April.....	4473	5178	—14	945,777	1,081,182	—13	211	209
May.....	5969	4071	+46	1,292,544	1,018,581	+27	217	250
June.....	7104	3681	+93	1,576,049	905,764	+74	222	246
July.....	2473	3754	—35	545,483	942,135	—43	220	251
August....	1885	2214	—15	424,798	559,023	—24	224	252
September..	1701	1930	—12	362,418	480,231	—25	213	248
October....	1161	1649	—30	221,118	386,782	—43	190	235
November..	1189	1415	—16	247,062	350,855	—30	208	248
December..	1181	2529	—53	236,707	648,360	—63	200	256
	32,757	30,875	+ 6	$7,085,375	$7,502,615	— 6	$216	$243

obtained from work of this character, particularly through a period when the abnormal stresses of the depression distort all comparisons, a few figures have come out of the record that are worth studying. And because general business has been steadily going down hill during these years the accomplishment is the more impressive.

Refrigeration sales in this Philadelphia territory cannot be estimated far back because no statistics were compiled until 1931. Since then monthly reports have been received from all members, embracing power company and dealer sales, and provide an accurate comparison of the last two years. The accompanying table analyzes these two years. These figures, by the way, are made up monthly in confidential reports to the association and the totals are reported back to the members. These reports have had a very practical value, because distributors and dealers plot curves of their own total sales and check the percentage of the business which they have secured. This gives an immediate index of their relative position in the trade and stimulates their selling.

The progress of range sales embraces only the two years 1931 and 1932, for there was no range business prior to that time. The accompanying chart shows the picture. In 1931 there was a spring campaign. In 1932 there was a fall campaign. The effect is striking.

There is one more interesting index, in the average total kilowatt-hour consumption of residence customers on the lines of the Philadelphia Electric Company, which is as follows:

	Kw.-Hr.		Kw.-Hr.		Kw.-Hr.
1921.....	373	1929.....	497	1931.....	600
1928.....	470	1930.....	552	1932.....	625

In the eight-year period before the organization of the association the average residence consumption increased from 373 to 470, a total of 97, and these were years of good business. In the last four years of steadily increasing hard times the average residence consumption has increased from 470 to 625, a total of 155, or 62 per cent more than the former increase in double the period. Undoubtedly the influence of the association has had a lot to do with this. Certainly it deserves the credit, for it is hard to explain it in any other way.

At the end of 1932 there were 329 members of the association of various classes. Total receipts for 1932, including income from shows, campaigns, etc., amounted to $250,000, of which $100,000 was obtained from membership subscriptions, the balance being raised by special contributions for specific activities. After all disbursements, more than $20,000 was set aside in the permanent emergency fund and the general bank account was not far below $20,000. The operating budget for 1933 totals $82,917 and is made up of the following:

Undistributed charges	$19,160.00
Refrigeration show and campaigns	1,900.00
Red seal wiring	2,425.00
Developing electric range market	2,600.00
Membership contact	3,300.00
Headquarters lighting exhibit	28,757.00
Give something electrical, etc.	1,775.00
Golf tournaments	250.00
Electric and radio show	5,900.00
Electrical maintenance engineers	3,050.00
Publicity and miscellaneous newspaper advertising	2,450.00
Co-operative dealer activity	11,350.00
Totals	$82,917.00

Items allocated to special shows are offset by special subscriptions that are earmarked for these purposes. And each is set up to pay its way.

That's the story, in so far as activities are concerned. There were two objectives in it all, of course: First, they wanted to increase the sale of electrical products and build up the load on the lines, and there is concrete evidence of success. Second, they wanted to promote harmony in the local industry and increase the effectiveness of everybody's efforts. What of that?

Evidences of accomplishment

Well, after a recent check-up on the ground with dealers, contractors, distributors, wholesalers, manufacturers and power company men, I would say this. The electrical industry of Philadelphia gives the Electrical Association credit for four accomplishments:

First—The work of the association has increased the volume of electrical business. The range campaign proves it because it has created a market not there before. They know that the electrical and radio show, the refrigeration show and the various campaigns have brought orders to the dealers for merchandise which the wholesalers and manufacturers have supplied. They have seen that they sell more working together, because they capture public attention and stimulate buying. So they believe it pays and intend to keep it up.

Second—Wholesalers, distributors, contractors and dealers have been greatly helped in their relations with the power company. They now have a standing in their negotiations with the power company that they never had before. In the past a contractor or dealer felt alone in making a complaint. Today he speaks with the status of a member of an association to which they both belong. He approaches the utility with confidence that he can secure attention, interest and justice without any conflict. At the same time he feels that the mental attitude of the power company men has also changed from antagonism to friendly co-operation. The trade now believes that it is getting a square deal all around.

Third—There is a general agreement that the ethics of the trade have improved. Joint ownership in a program that is constructive has dramatized the common interest which these men have in the market. Contacts are closer, problems are now being solved together and competitors who used to pass without speaking have become friends. As fellow members of the same association they have been meeting together and the rest follows.

Fourth—They see that they have not yet begun to realize the possibilities for good in this co-operative work. They cannot yet appraise the value of the association, because so far they have been working under abnormal business conditions. As the depression fades out and good times return they expect the benefits to steadily grow larger and more apparent. The accounting service, for instance, has not yet had a chance to contribute to better economics in competition, through better knowledge of costs, because prices are now ground down by the pressing need to get an order. But already they feel that the association has

had a far-reaching influence for good that has made Philadelphia a better town to do business in.

Only one complaint is heard that is important. There is dissatisfaction with the present method whereby range-wiring jobs are given out to the contractors. The system is to call for three bids on each installation and give it to the low man, and the work is practically all going to curbstoners at prices that no responsible contractor can meet. They realize that the power company cannot legally restrict the work to members of the association. They do not ask that. But they do believe that the work should not become the crutch on which innumerable wiremen are maintained in competition with the contractors, because that is bad for the industry. It lowers all standards—price, adequacy, service and responsibility.

The contractors believe that the power company should demand that the men who do the range wiring for the industry should at least have a place of business, a fair knowledge of costs and an adequate experience. They feel that this work should go to men who will promote the industry, by maintaining quality, and selling more outlets and more appliances, and not pauperize the range-wiring business by making price the only measure. But they all seem to believe that the trouble will be corrected, just as other difficulties have been straightened out, when the association can bring it about.

Success factors

So the various groups meet together. The manufacturers' division is divided into several committees of men interested in different classes of product. They are all busy about their problems and they see that they are making progress. For the association has done more than just promote harmony among electrical men. It has given the industry a new status in approaching the public. For example, the Philadelphia Electric Company in the past has been able to make little headway in interesting the schools in lighting and eyesight conservation. Its own self-interest was too obvious. But the Electrical Association has been most successful. The school staff has come to the Lighting Exhibit to study equipment and for conference. Classes have also come in for demonstrations and 45 schools are now revamping their lighting. And there you are.

Horace Liversidge says that Conover deserves the credit because he has had the initiative and courage to start things and carry them through, to be a manager and not just a secretary, to run the association and not just work for it. But George Conover says that Liversidge is responsible because his energy, enthusiasm and leadership, and above all his active personal participation in the whole program, have convinced everybody of the sincerity of the power company in its co-operation. Liversidge, he says, has been four-square in every conflict of interest between the utility company and any other branch of the industry and met issues on merits.

They say in Philadelphia that the secret of success in an association of this kind lies in the direct participation of a chief executive of the power company. He can deal with the heads of other businesses on a basis of equality. He can mediate between competing manufacturers or wholesalers. He can speak for his company on general subjects and he can command the support of his own company personnel. Too often the utility is represented in the association by its appliance sales manager and he is at an immediate disadvantage. He is a direct competitor of the dealers for he must show results for his department, and is inevitably on the defensive in many considerations of trade policy. The co-operation of the general sales manager of the utility is, of course, vital, and George E. Whitwell, vice-president of the Philadelphia Electric Company in charge of sales, is a director of the association and an active leader in the work.

Mr. Liversidge believes that his company has more to gain from the association than any one else and should, therefore, give more. The manufacturer, wholesaler, contractor and dealer each joins for self-interest and benefits from his own angle. So does the power company, but it gains from all angles. For what the utility needs most is friends in the trade, and it benefits from the increased sales and improved prosperity of every member of the local industry. It can well afford, therefore, to help in every possible way to co-ordinate the marketing of the local industry, to reduce the waste of destructive competition and to capitalize the creative power of intelligent co-operation. And this, I believe, is being accomplished in Philadelphia.

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Primary Network Experience at Boston

Excellent service has been rendered by the Boston Edison Company's 4-kv. pioneer primary network installation, according to a recent talk by W. B. Elmer before the New England System Operators' Club. To date the company has experienced 3.5-vault years of operation, five transformer-years and ten circuit-years. As is generally known, the system consists of 1,500-kva. vault type units fed from 13.8-kv. lines and distributing at 4-kv., Y-connected with grounded neutral. To prevent hunting or excessive circulating currents between vaults which are occasionally fed at slightly different phase angles, the line-drop compensators controlling the load ratio tapchangers were reconnected so that the reactive element was reversed in polarity, the resistance element being slightly overcompensated. This arrangement tends to equalize power factors at various vaults as well as to adjust to specific voltage values. Circulating currents have been negligible.

When the street pedestal outside the vault is called on the telephone by the trouble dispatcher a buzzer signal is returned if anything is wrong at the vault. Open circuits and open feeder switches are indicated by different tones. The equipment is relatively simple and inexpensive and is believed to be the only economically warranted scheme for the type of installation to be supervised.

Some trouble has been experienced from the recording instruments, mainly in inking. Improved designs have been made and difficulties temporarily obviated by shutting down circulating fans and allowing the vaults to warm slightly in very cold weather. "Fabrikoid" tapchanger gears were installed after complaint as to noisy operation and a silent fan provided in one vault in a residential area. Service has been well maintained during storms, tree troubles and a flashover on a neighboring interconnected system.

Hydraulic Power Equipment Costs at 15-Mile Falls Plant

From data filed by the Connecticut River Development Company with the Public Service Commission of New Hampshire in connection with the construction of the Comerford station at Fifteen-Mile Falls are taken the following hydraulic power equipment costs. The account classification covers the cost of four 54,200-hp. S. Morgan Smith turbines rated at 180-ft. head, speed 138.5 revolutions per minute; actuator type governors (190,000 ft.-lb. capacity); four 16-ft. diameter Dow disk arm pivot turbine inlet valves hydraulically operated by 36-in. diameter cylinders at 200-lb. pressure; station service pumps, piping, tanks, metering equipment, preliminary operation and tests. The plant was dedicated in the fall of 1930. It is of 156,000 kva. capacity.

(Penstocks Under Another Account)

Summary

	Total	Per Kva.
1. **Waterwheels and governors**		
(a) First cost and freight	$321,914.29	$2.06
(b) Erection	116,217.96	0.745
2. **Turbine inlet valves installed**	112,875.95	0.72
3. **Penstocks** (under another account)		
Miscellaneous installed costs		
4. Piping for valve operation	2,332.54	
5. Station service compressors, etc.	1,982.95	
6. Station service pumps, motors, etc.	3,583.32	
7. Hydraulic oil and air piping	11,154.33	
8. Water-metering equipment	8,126.20	
9. Testing and starting up	3,858.67	
10. Cost of tests during preliminary operation	7,076.53	
11. Salt velocity test on one wheel	5,177.17	
12. Draft tube pumping	10,051.68	
13. Fire protection, hydraulic piping	779.76	
14. Station reserve oil (Transil No. 10)	2,181.41	
15. Total miscellaneous	$56,304.56	$0.36
Total of above hydraulic equipment costs without interest during construction and contractors' expense	$607,312.76	$3.89

Detailed Breakdown

1a **Waterwheels and governors** (first cost and freight)	
Four waterwheels including scroll cases and pit liners, delivered at Inwood, Vt.; contract	$260,885.00
Spare parts	8,425.00
Extras due to change in contract	33,090.00
Laboratory tests on turbines	10,460.31
Selsyn transmitting motors and shaft	768.00
Photostats of drawings	41.60
Total turbine contract	$313,669.91
Material, continued	
Rods and jacks for supporting scroll cases	745.38
Lifting device	321.14
License	300.00
Miscellaneous pipe and fittings	333.11
Oil, 7,199 gal. at $0.31	2,226.00
Eight switchboard panels, 60 sq.ft.	149.75
4 Tachometers, pulleys, magnetos, guide rings, etc.	490.40
4 Dial type Foxboro thermometers	192.44
4 18-in. gate valves, penstock drainage	899.40
Pipe and fittings, penstock drainage	2,549.35
Miscellaneous freight and handling	37.41
Total	$321,914.29
1b **Erection Costs** (including freight from Inwood)	
Labor	49,294.16
Material	
Installation of scroll cases	31,775.19
Payments to turbine maker	9,224.22
Payments for inspection	1,285.87
Board of erector, inspector and others	677.85
Lumber	903.24
Oxygen and acetylene	1,707.43
Coal and coke	871.98
Handling charges	979.83
Traveling expense	1,833.39
Stores and miscellaneous supplies	4,830.38
Pipe and fittings	506.41
Tarpaulins	101.40
Rivet sets	486.27
Miscellaneous cable, slings, etc.	861.24
Gasoline, kerosene and fuel oil	1,199.81
Prorated charges, rr. operation, power, etc.	7,969.99
Total material	$66,923.80
Total erection	116,217.96

2. **Turbine Inlet Valves** (first cost and freight)	
Contract price four valves	$96,240.00
Four control valves	3,080.00
Testing four cylinders in laboratory	440.00
Testing two valves	1,170.00
Thrust disk on upper end of hub	690.00
36 photostats of drawings	14.40
1 valve disk lifting device	23.00
Bessemer valve oil	10.26
Miscellaneous material	24.24
Less credit for one set anchor bolts	33.63
Total	$101,658.27
Erection	
Labor	7,348.32
Material	3,869.36
Total erection	$11,217.68
Total cost turbine inlet valves	$112,875.95
4. **Hydraulic Piping for Valve Operation**	
Labor	1,335.16
Material (incl. pipe, fittings, valves)	997.38
Total	$2,332.54
5. **Station Service Compressors, Motors and Control**	
Labor	$224.31
Material (one 173-c.f.m., one-stage compressor and receiver; one two-stage compressor and receiver with 5-hp. motor)	1,400.00
One 25-hp. motor for one-stage compressor	276.35
Stores, handling charges, etc	82.29
Total labor and material	$1,982.95
6. **Station Service Pumps, Motors and Control**	
Two 250-g.p.m. (300-lb.) centrifugal pumps for operating inlet valves; one 150-g.p.m. sump pump (7.5-ft. head) with 1.5-hp. motor, and one 150-g.p.m. pump, 5-hp. motor.	
Labor	$666.48
Two 250-gal. pumps and motors	1,033.65
Two undervoltage releases	50.40
Two sump pumps and motors	1,067.70
Freight and miscellaneous	229.17
Total labor and material	$3,047.40
Total including motor cost adjustment	$3,583.32
8. Water-metering equipment and gages — Covering head and tail water gages, staff gages and four Bailey recording fluid meters:	
Labor	$3,072.12
Material (including four Bailey meters $2,064)	5,054.08
Total cost	$8,126.20
9. Testing and starting up:	
Labor	$2,514.15
Material	1,344.52
Total cost	$3,858.67
11. Salt velocity test on one wheel (71 sacks of salt required at cost of $79.22)	$5,177.17
14. Station reserve oil (spare for waterwheels and transformers, 7,524 gal. at $0.25, $1,909.59) including freight, etc.	$2,181.41

France Plans to Electrify 6,000 Miles of Railroad

By ROBERT F. STOCKAR
Zurich, Switzerland

SUCCESSFUL results with the French railroads electrified since 1920 have given a renewed impetus to the program to put all possible and feasible mileage on an electrified basis. Some 6,000 miles could be expected to pay, and of these about 2,600 miles could be viewed as so favorable as to reflect savings of 450,000,000 francs annually in railroad service costs. To execute the larger task will require a capital outlay of about 5,000,000,000 francs spread over a ten- or fifteen-year program period.

There are in France seven large railroad companies. Etat, Nord, Est, Paris-Lyon-Mediterranee (P.L.M.), Alsace-Lorraine (A-L), Paris-Orléans (P-O) and Midi. With the exception of the first, which is state-owned, they are private companies and are independent of each other, although there exists a "Caisse commune" out of which the deficits—if such occur—are paid, if necessary with the aid of government funds. In 1918 there was no electric traction on the lines of these companies, with the only exceptions of a few Paris suburban lines and some lines of the Midi Company in southern France, which latter had been electrified on the single-phase system shortly before the outbreak of the war.

First program laid out in 1920

In 1920 a very large electrification program had been worked out with the main purpose of reducing the imports of foreign locomotive coal and thereby improving the trade balance. This program called for the electrification, with direct current, 1,500 volts, of one-fifth of all the lines of the seven companies and provided for the construction of hydro-electric power stations to furnish the traction energy, and it so happened, fortunately, that the sites of these power stations were quite near to the lines with steep grades, where electrification was bound to give the most advantages. This program has, however, not been worked out very far, and at the end of 1931 the situation was the following: Nord, Est and A-L use exclusively steam traction, Etat has electrified the Paris suburban zone, P.L.M. works electrically the mountain line Culoz-Modane, P.O the line Paris-Vierzon and Midi a network of lines with an extension of 950 route-miles.

It looked as if the further execution of the program of 1920 had been abandoned, or at least stopped for a long time. One reason for this may be that the cost of the work done until 1930 was rather high owing to the high rate of interest which had to be paid at the time the electrification capital had to be raised. On the other had, these electrifications were, technically speaking, a complete success.

During 1930, therefore, the opinion prevailed in the technical world that the electrification should be further extended, and toward the end of that year several experts in electric traction and other men interested in the matter got together and formed the Office Central pour le Développement de la Traction Electrique ("Odetrel"). The purpose of this organization was, first, to find out for which of the lines of the seven companies the electrification would be commercially advantageous and, secondly, to establish the most practical program for their electrification. The first point necessitated detailed studies of existing traffic conditions, while in the establishment of the program the possibilities of raising the necessary capital had to be considered, as well as the output capacities of the French engineering firms, because the intention was of course to have practically all the electrification material built in France. An intensive co-operation was therefore necessary with the companies' staffs as well as with the state authorities and the engineering firms.

Alluring savings are indicated

"Odetrel" has already done much work. A first report, dated March, 1931, indicates in the first place some basic numbers obtained from the French electrifications already in service: 1 kw.-hr., measured at the high-tension entrance of the substations, is equivalent to 2 to 4 kg. (4.4 to 8.8. lb.) of coal on the steam locomotive; the cost of moving trains and of maintenance is lower with electric than with steam traction, the difference being between 3 and 5 francs (French currency), and in some cases even reaching 5.60 francs per train-mile; one electric locomotive, costing about 2,000,000 francs, replaces in service at least two steam locomotives costing together also about 2,000,000 francs; one such electric locomotive saves annually about 250,000 francs in train movement and maintenance as compared with the steam locomotives necessary for the same service; the capital which must be raised for the electrification amounts to 1,300,000 to 1,600,000 francs per route-mile of double tracks.

Basing the calculations on these figures and on the existing rates for coal, electric energy and interest for capital loans, "Odetrel" has found that indeed there are many lines which could be electrified to advantage, or, in other words, where the operating expenses for electric service, increased by the charges for interest and depreciation on the electrification capital, are less than the operating expenses under steam service for the same traffic.

Intangible benefits not evaluated

In making these comparative calculations no attention was paid to a series of conditions which in principle are favorable to electrification, but the advantages of which cannot be expressed exactly in francs. There is, for instance, the increase in traffic capacity which permits more electric trains to be moved over a given section

than under steam service. Also, in some cases, the double-tracking which would be necessary under steam service can be postponed on account of the electrification. Other such conditions are: More comfort in traveling due to smoke elimination; increase of average train speeds, an important factor in the fight against the competition of the automobile; lighter work for the locomotive crews; elimination of fire risks from sparks thrown out by steam locomotives; higher value of real estate in the neighborhood of lines and stations (no smoke); less work in cleaning and maintaining rolling stock, bridges, etc., for the same reason; advantage for the country's foreign trade balance, by reduction of coal imports.

In spite of non-consideration of all these points, "Odetrel" has found by careful studies and calculations that of the French companies' lines there are more than 6,000 miles on which the electrification would be a paying business, and that of these 6,000 miles 2,600 miles might be chosen as being the most favorable for electrification because their traffic is almost half of the total traffic of the seven companies, although their aggregate length represents only about 15 per cent of the total length. The yearly saving by electrification of the 2,600 miles alone would amount to 450,000,000 francs.

But in order that a task of this magnitude, the report goes on to say, may be executed with a maximum of efficiency, a plan should first be prepared stating in how much time the work should be executed (ten to fifteen years is proposed) and where the lines to be electrified should be grouped according to the urgency of their electrification; the types of locomotives and motor-coaches to be used should be standardized as far as possible, also in their details, so as to get simpler and cheaper maintenance and lower manufacturing costs for large series, besides the possibilities of using locomotives and motor coaches of one company on the lines of the others. Of course, the plan should also consider means of raising the necessary money, about 5,000,000,000 francs, in the financial market.

Consideration of the electrification problems from a military point of view is another point which could not be overlooked. The report states that both in Italy and in Germany there are electrified railroad lines which would have military importance in case of a conflict, and goes on to say that in our time, with interconnection of power companies' networks and multiple feeding points, with portable substations and oil-electric locomotives for use in stations and yards, etc., many objections of a military order which years ago were very important cannot be kept up any more. And besides, even with electric service on all the lines mentioned, there would still be left, on the other lines still worked by steam, a number of steam locomotives more than sufficient for such special contingencies. But of course the report, considering the matter as it does from all sides, concludes that for the preparation of the plan co-operation with the military authorities is also necessary.

Big factor in unemployment relief

It is not surprising that the report calls attention to the fact that the proposed electrification, besides being a paying business in itself, is a very practical and useful means, under the present circumstances, for providing work to the industry and its workers suffering from the

consequences of the crisis. This is quite easy to understand if one considers that of all the money to be spent for the electrification more than 80 per cent would remain in France and less than 20 per cent would have to go to foreign countries to pay for raw material not produced in France.

As conclusion, the report gives a table of those lines which could be electrified immediately to great economical advantage. They are:

		Miles	Miles
Etat	—Paris-Le Hâvre	178	
	Paris-Laval	188	366
Nord	—Paris-Amiens-Lille	176	
	Douai-Valenciennes-Quiévrain	31	
	Valenciennes-Hirson	47	254
Est	—Paris-Strasbourg	314	
	Nancy-Metz	36	
	Metz-Longuyon-Mézières-Hirson	81	431
P.L.M.	—Paris-Lyon-Marseille	546	
	Marseille-Menton	157	
	Givors-Nîmes	162	865
A-L	—Thionville-Metz	...	
	Sarrebourg-Strasbourg-Bâle	...	207
P-O	—Orléans-Tours	71	
	Vierzon-Limoges	125	196
Midi	—Bordeaux-Montauban	...	
	Toulouse-Narbonne-Séte	...	298
	Total		2,617

This mileage would probably be increased still further by a few short connecting and additional lines, which in themselves would not be favorable for electrification, but which, when electrified together with the other lines, would procure general advantages for the working of the railroads by permitting them to locate the limits of electric and steam service in the most convenient points.

This information shows that while in many countries the electrification of steam railroads has been stopped or has slowed down, for quite different reasons, in France it has received a new and strong impulse, and it is to be hoped that the French companies may soon make full use of the great work which "Odetrel" has done and is still doing, and that the program as worked out will form the basis of the work to be undertaken. That there is a tendency to extend the electrifications which exist already is evidenced by the constant extension of electric service on the lines of the Midi Company, as well as by the fact that the Paris-Orléans Company has already decided to electrify the line from Orléans to Tours, for which the material was ordered in the beginning of this year.

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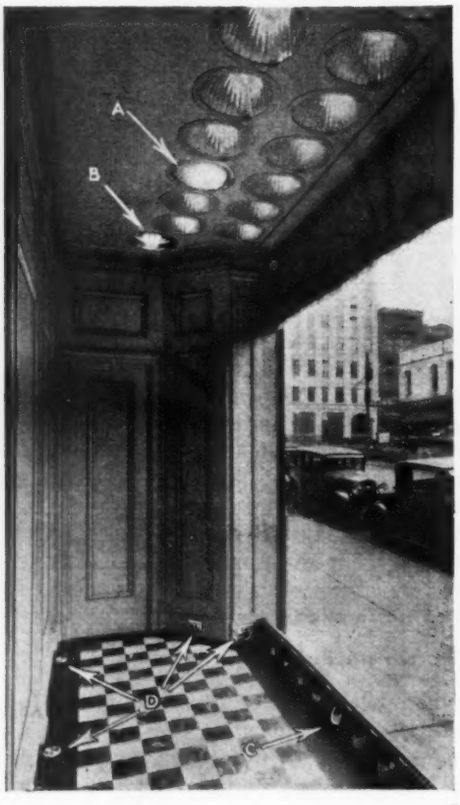
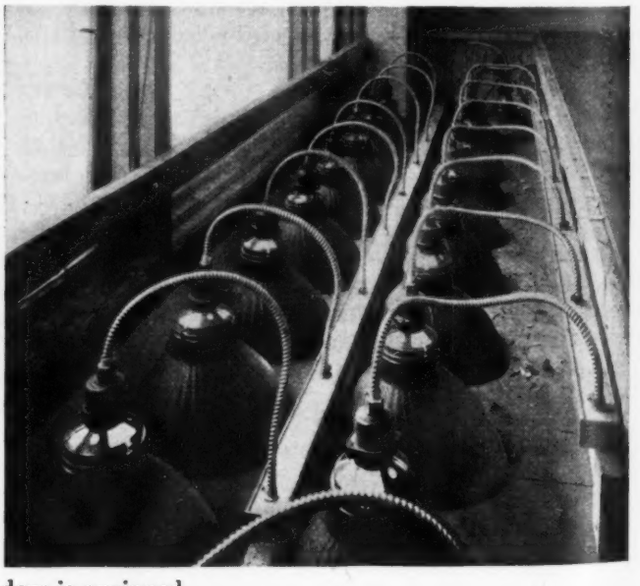
Demonstration Show Window Sells Lighting

A SUPER-LIGHTED model show window constructed and maintained by the Birmingham (Ala.) Electric Company has had a big part in convincing merchants of that city regarding the merchandising value of proper window lighting. Merchants are permitted turn-by-turn to display their goods in this show window and many of them have expressed amazement at its selling power. When this demonstration show window was first completed representatives of the lighting division went to all of the better class merchants, advised them of the construction of the window, showed them photographs and explained what could be expected from an installation of this type. Each merchant was given an opportunity to book a display for one week in the window free of charge. At first the merchants were rather indifferent toward the proposal, but the company now has a waiting list for several months ahead.



Merchants in Birmingham have the opportunity to test the pulling power of high-intensity lighting, color and spot lighting with this model show-window equipment constructed and maintained by the Birmingham Electric Company. Overhead in two rows are sixteen No. 910 500-watt X-ray reflectors (A), and two No. 88 Hippo 500-watt floodlamps (B). At the base of the window is an 11-ft. section of footlights (C), using twelve 150-watt clear lamps. Also note floor and baseboard outlets (D). Color equipment is provided for all the lights. The flush-mounted ceiling lights are wired with "Curtisstrip." Control rings are used when high-intensity spot work is desired. The floodlamps are mounted on rockers and adjustable lugs as they may be directed as desired. A dead-front panel with twelve double-pole tumbler switches control as many circuits to permit flexible arrangements.



How the model window is equipped

In the three years or better during which the window has been in operation the company has sold window lighting jobs to scores of merchants, including the heads of Loveman, Joseph & Loeb and Louis Saks, two largest department stores in the city. Within the past two years there has hardly been a window installation made in the city in which the merchandising department has not had part either in selling the installation or in designing it for the merchant or contractor. In twelve months alone the company installed in the neighborhood of 150 complete window installations and designed at least 50 more either for architects, merchants or contractors. The minimum window installation recommended consists of 150-watt units on 12-in. centers; 15 per cent of the total installed are of this type. Eighty per cent consist of 200-watt units on 12-in. centers, and about 5 per cent are 500-watt units on 15-in. centers.

A check was made on the number of passers-by who stopped to see a display made by the Burger-Phillips Dry Goods Company in the demonstration show window. The morning this display was installed the window was operated for three hours without any lighting at all and the stoppage was one out of ten persons. The next hour 200 watts per running foot were turned on and the stoppage was approximately 3½ out of ten. The next hour 500 watts per running foot were turned on and five out of ten persons stopped. During the lunch hour the company turned on complete color lighting and the stoppage was eight out of ten.

During the entire week intensity on the window was varied from 200 watts per running foot to 1,000 watts per running foot and it was found that there was a marked increase in stoppage as the intensity of illumination went up and that the maximum increase was secured when color lighting was turned on.

Among the numerous letters which the utility has received from merchants who have used the demonstration window are several reporting that the displays had been sold twice in one week. One merchant received eighteen calls the first morning his display was installed.

The window has been quite a good-will builder for the company, but results have been more tangible than that. It is returning new business equivalent to many times its cost. Merchants have been shown what can be done by good window lighting and a spirit of rivalry in their lighting displays has developed. New leads are constantly being developed from the contacts with merchants and some of these are resulting in sales. Hardly a store can be found that does not need something new in lighting, either improved general lighting, more showcase lighting, color-matching units, better show-window lighting or some other similar lighting item.

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READERS' FORUM

"St. Lawrence" Cannot Lower Domestic Rates

To the Editor of the ELECTRICAL WORLD:

The article "St. Lawrence Tied to Promotion of Domestic Load," in March 25 issue of ELECTRICAL WORLD, has the following sub-caption: "Power authority believes that 3-mill power can be delivered in New York City for 5 mills to sell for 3 cents and pave the way everywhere for the long-predicted 3,000 kw.-hr. home."

These bulk power developments usually have as their basic foundation flood control, irrigation or improvements to navigation, and, as such, their cost up to the mouth of the penstocks can, and should, be absorbed in that primary purpose. From that point on, however, the production of by-product electric power should be made to "stand on its own bottom."

Under no condition should it be permitted that such projects—be they under public or private sponsorship—be offered to the public under false colors or misleading statements. The caption of this article might readily come within that category when read by the uninitiated domestic consumer.

Such existing consumers, with their present average consumption of 600 kw.-hr., probably pay around 6 cents for energy; they might conclude, therefore, that with St. Lawrence power their bills would be halved. As a matter of fact their bills could only be cut about 8 per cent if it were possible to deliver St. Lawrence power to their local utility, for distribution, at no cost whatever.

The average energy rate today for consumers using 3,000 kw.-hr. is between 2.6 and 2.7 cents, or about 10 per cent below what this St. Lawrence power article offers. Most of the domestic consumers in the St. Lawrence economic area can today obtain 3-cent energy if they will increase their consumption to 3,000 kw.-hr. All of them can do so if they will insist upon their regulatory commission and their utility executives getting together on the rate question on a true common-sense basis. All that is necessary is to build up a more or less uniform rate structure founded upon "value of service" and giving due weight to true "cost of service."

The caption admits a spread of six to one between busbar cost and that of energy delivered at the kitchen door. It does not, however, particularly stress that point, and that is the real problem of all utilities today, be they public or private. When this abnormal spread is decreased, either by better distribution methods or by increased average consumption, and the public educated to accept and pay this delivery cost as a lump sum charge, then domestic consumption will not only average 3,000 kw.-hr. but more nearly 10,000 kw.-hr.

Energy is being produced today, on the average, throughout the country for 5 mills or less. That does not always include fixed charges such as interest, taxes, depreciation, etc. Neither does St. Lawrence power reduce these fixed charges, since the public demands, and requires, standby service to insure continuity. With such essential service continuity to face—and it is fact and not fancy—these bulk power projects have little to offer that is not already obtainable. As proof of this I have before me right now a published domestic schedule of the "inducement" type that is being applied to many thousands of consumers, and could well be fairly applied to millions of others. Under this schedule a consumer using 3,000 kw.-hr. gets his energy at an average price of 3.14 cents.

S. B. HOOD.

San Leandro, Calif.

BOOK REVIEWS

Public Utility Rate Structures

By L. R. Nash. Published by the McGraw-Hill Book Company, 330 West 42d Street, New York, N. Y. 379 pages. Price, $4.

Appearance of Mr. Nash's book on rate structures is particularly appropriate just now when public misunderstanding of utility economics is joining economic distress to throw all rate levels and forms into question. In fact, the author might well have added to his subtitle, "a reference book for rate designers, executives and students," the social reformers and professional agitators. They too could learn why rates take so many forms, how they are derived and justified and how they are applied to accomplish specific objectives.

The newer forms of promotional rates are analyzed and traced through their regulatory adjustments. Manipulations that are necessary to bring theoretically perfect rates into conformity with practical requirements are frankly outlined. And in addition the various methods of cost allocation proposed over the last ten years are dissected and reconciled with one another; a sample breakdown is included. Closing chapters discuss discounts, deposits, combined billing, optionals, etc., and present condensed statistics and characteristic loadings. To meet the common plea for a universal electric rate Mr. Nash derives one which will be "applicable to any and all classes of service." It takes six fine-print pages to state it and probably would leave Mr. Grumble far more befuddled than he is now with a variegated assortment.

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Designing for Arc Welding

Published by the Lincoln Electric Company, Cleveland, Ohio. Illustrated, 450 pages. Price, $2.50.

Cutting costs by redesigning is the theme of this book, which contains prize-winning papers submitted in the $17,500 second Lincoln prize competition. The published papers are those judged the best from some 400 submitted in the competition and include the work of foremost engineers in the United States and abroad. The book consists of approximately 450 pages, divided into five sections, as follows: Part I—Machinery; II—Shipbuilding; III — Buildings-Bridges; IV — Large Containers, and V—Piping and Fittings. In every case the fundamentals of the design are so explained as to make them applicable to other industries.

The use of arc-welded alloys to resist corrosion, substitution of arc-welded steel for aluminum without weight increase, welding of high tensile steels, structural design for the resistance of earthquake shocks are a few of the interesting new developments which are discussed.

One of the principal points on which the papers in the competition were judged was the saving in costs made by the use of arc welding. Each paper gives actual costs and shows how the savings were effected. A résumé of the possible savings in all industries represented by the papers submitted shows a total estimated saving of more than one billion dollars a year, if arc welding were used as extensively as possible.

Among the contributors are Lieut.-Com. Homer N. Wallin and Lieut. Henry A. Schade, United States Navy, winners of the first prize; H. H. Tracy, structural engineer, Southern California Edison Company; Major G. M. Barnes, Ordnance Department, United States Navy; H. J. L. Bruff, London & North Eastern Railway, London, England; William H. Zorn, Detroit Edison Company; Raymond Hoffman, Standard Oil Company of New Jersey; Gustav Wahl, chief naval architect, Deutsche Werke Kiel, Kiel, Germany; K. T. Sorenson, designing engineer, Baldwin Southwark Corporation, and many others. The editor is A. F. Davis, vice-president of the Lincoln Electric Company.

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Inflation

By Donald B. Woodward and Marc A. Rose. Published by Whittlesey House (McGraw-Hill), 330 West 42d Street, New York. 165 pages, illustrated. Price $1.50.

"Like rum or religion, inflation and deflation are among the things men cannot debate in the light of cold logic," concede the authors, yet with admirable erudition in the historical elements of a civilization-old case they have for the greater part of their interesting volume maintained an air of dispassionate and easy exposition. To be sure, they are inflationists and more, for they advocate the wholly managed dollar, but they have frankly followed the road from Rome to Ruin.

Carter Glass has said: "The history of inflation has been recited. . . . Yet here today we are flying right in the face of human experience, rejecting it all." The authors have followed the story of currency's ups and downs through the ages; they are most explicit as to the dire results of previous efforts, yet they tell us that all will be different this time.

One wonders just why today should be the day of exception. The sacred fetish of the moment is a return for commodity prices to 1926 levels, yet those levels of 1920 to 1929 constitute a plateau following the war and post-war upsurging that fails to explain away the levels and story of the past. After 1869 and up to 1916 commodities were never once so high as in 1869. Today they are not below the approximate figures for 76 of the past 134 years. Perhaps we are even now near the level of inherent world stability and war booms and aftermaths should be forgotten.

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Telephone Theory and Practice: Manual Switching and Substation Equipment

By Kempster B. Miller. Published by McGraw-Hill Book Company, New York. 426 pages, illustrated. Price, $5.

"Theory" in this book is confined to the practical requirements of operation. "Practice," on the other hand, applies not only to discussing the degree to which various kinds and makes of substation and switching equipment are employed but also to the operating technique of the telephone companies which use them. Both Bell and "independent" company practices and equipments are described and analyzed. Except that it leaves machine switching and auxiliary equipment to the companion volume, this book constitutes a comprehensive survey of telephone practice at the central office board and at the subscriber's set.

Men of the Industry

Gilson New Vice-President of New York Utility

W. J. Gilson, general superintendent of power and construction since the organization of the New York Power & Light Corporation in 1927, has been elected a vice-president of the corporation. Mr. Gilson is in charge of engi-

neering, power supply and construction and has supervised the company's extensive power expansion program during the past few years, including the building of the 145-mile, 110,000/132,000-volt line interconnecting the Niagara Hudson and New York Edison systems.

Mr. Gilson was graduated from Worcester Polytechnic Institute in 1913, and before his connection in 1921 with the Adirondack Light & Power Corporation, predecessor company of New York Power & Light, he was associated with Stone & Webster, Inc. He spent about a year in the Boston office before he was assigned to the properties at Houghton, Mich. During his connection with the Houghton properties Mr. Gilson obtained a wealth of experience in various engineering and supervising capacities and just before transferring his interests to the East he was serving as electrical engineer and superintendent. Major projects supervised by Mr. Gilson during his twelve years' association with the New York Power & Light Corporation and predecessors are the construction of hydro-electric plants at Beardslee Falls and Sprite Creek and extensions to the Spier Falls station, as well as the large substations at Menands, East Greenbush, South Bethlehem, Rotterdam, near Schenectady and North Troy.

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Fred Norcross, manager of the Home Gas & Electric Company, Greeley, Colo., has severed his connection with that utility. Mr. Norcross has been identified with the company since 1913 and during that period of time has been active in association work in the Rocky Mountain district.

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Edward B. Lee, formerly chief statistician for the Electric Bond & Share Company and its affiliates, has been elected a vice-president of the American Power & Light Company, the National Power & Light Company, the Electric Power & Light Corporation, the Lehigh Power Securities Corporation and the United Gas Corporation. Mr. Lee entered the employ of Electric Bond & Share in 1911.

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H. V. Erben Named Manager of G. E. Switchgear Sales

H. V. Erben has been appointed manager of the switchgear sales division of the central-station department of the General Electric Company, with headquarters at the West Philadelphia Works. Mr. Erben was appointed to succeed J. W. Upp, who retired May 1 after 32 years of service with the company, including 26 years as manager of the department. Mr. Upp will continue in an advisory and consulting capacity to the switchgear division of the central-station department (formerly the switchgear sales department) and as a consultant for other departments of the company.

Mr. Erben was graduated from Yale, in the mechanical engineering course, in

1919, following interruption of his course by the war. In 1920 he entered the employ of the General Electric Company in the test course. After completion of the course he was, in succession, in the central-station engineering and commercial departments, and in 1929 was appointed manager of the apparatus division of the central-station department.

H. B. Gear Named President of Western Engineers

Harry B. Gear, assistant to the vice-president of the Commonwealth Edison Company in charge of operating, construction and electrical departments, was elected president of the Western Society of Engineers at the annual election held recently. Mr. Gear has been a member of the society for 26 years. His professional career began with the Commonwealth Edison in 1895 as an inspector and it was from this position he advanced in 1921 to be assistant to the

vice-president. In addition to being an acknowledged authority on electrical distribution, he is the author of a textbook on that subject which has gone through three editions, and is also author of the section on distribution in the Standard Handbook for Electrical Engineers. The Western Society of Engineers awarded him the Chanute medal in 1910 for a paper on Diversity Factor in the Distribution of Electric Light and Power." He is a fellow of the American Institute of Electrical Engineers.

Charles C. Whittier, Leigh S. Keith and Louis R. Howson were elected first, second and third vice-presidents respectively; Paul A. Westburg was named treasurer and L. R. Mapes trustee.

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OBITUARY

Major Robert Samuel Hardy, wartime director of Niagara Falls power distribution and more recently assistant general manager of the Niagara, Lockport & Ontario Power Company at Buffalo, N. Y., died May 2 at his home in Los Angeles, Calif. He was 59 years of age. Major Hardy was born in Bangor, Me., and was graduated from Massachusetts Institute of Technology with honors as an electrical engineer in 1896. In 1904 he went west and took a position on the engineering staff of the Los Angeles Gas & Electric Corporation. He remained with the cor-

poration until the United States entered the World War, when he enlisted, received the rank of captain and, after training at Fort Leavenworth, Kan., was sent to Buffalo to direct power distribution. He became assistant general manager of the Niagara company in 1919. Illness forced his retirement from that company about four years ago.

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ARTHUR H. SAVAGE, president of the Union Public Service Company, St. Paul, Minn., died recently. Mr. Savage's first connection with the electrical industry was as a partner in the electrical contracting firm of W. I. Gray & Company, Minneapolis, and subsequently he became identified with the General Electric Company. In 1912 he became treasurer and half owner of the Dakota Light & Power Company, in 1920 treasurer and half owner of the Union Public Service Company of Minnesota and in 1921 president of the Midwest Power Company. He held these positions for many years. A few years ago he assumed the duties of president of the Union Public Service Company.

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ALBERT F. NELSON, vice-president of the Edison Electric Illuminating Company of Brockton, Mass., died in that city May 3. Mr. Nelson was born in Brockton in 1877, and in 1901 he entered the employ of the company as a bookkeeper. Five years later he was made plant superintendent, and in 1910 he succeeded C. W. Kellogg as manager, continuing in that position until 1927, when he became vice-president. He was a director of the Montaup Electric Company, the generating and transmission organization serving the Eastern Utilities Associates group and owned in part by the subsidiary properties of that Stone & Webster enterprise.

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ROBERT ORSETTICH, chief engineer of the General Electric Company, Ltd., London, England, since 1918, died recently in that country. In the capacity of chief engineer Mr. Orsettich had sole charge of electrical and mechanical designs of all machines manufactured by the company, as well as all inspection and testing. During this period he also had charge of the experimental laboratory and had been advising the directors on matters of patents and general engineering policy. A native of Austria, Mr. Orsettich had a wealth of engineering experience on the Continent before he became electrical designer with Sir W. G. Armstrong Whitworth & Company at Newcastle-on-Tyne, England, in 1902. His first connection with the General Electric Company was in 1903, when he was appointed chief electrical designer of the Wilton Works, Birmingham.

New Equipment Available

Resin-Insulated Cable

Cable insulated with "Glyptal"-treated cloth and capable of resisting oil and withstanding high temperatures, available in all types, has been announced by the General Electric Company. In addition to its ability to resist oil and heat, this cable is characterized by unusual flexibility and toughness that enables it to stand severe mechanical strain. "Glyptal" is a synthetic resin, produced from phthalic anhydride and glycerine, and is unaffected by mineral oil. Because of this inherent quality, "Glyptal"-treated cloth has a distinct advantage over varnish-treated cloths as an insulation material. This new cloth also maintains its original properties over long periods of time, even at elevated temperatures.

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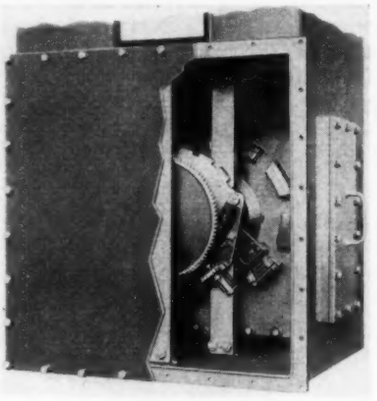
Automatic Feeder Voltage Regulator

Automatic feeder voltage regulators for applications where the induction type of regulator has heretofore been used have been announced by the Allis-Chalmers Manufacturing Company, Mil-



waukee, Wis. The equipment operates on the basis of an automatic tap-changing device with suitable transformers, all built into a small, compact unit. The equipment is suitable for either indoor or outdoor application and for single-phase or three-phase operation.

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GEAR MOTORS in sizes rated ¾ hp. and up have been announced by the Reliance Electric & Engineering Company, Cleveland, Ohio. These combine motor and speed reducer into one compact, self-contained and fully protected unit. A cartridge-type gear unit carries all gears and bearings except the high-speed pinion and bearing. The cartridge can be readily removed without disturbing the alignment of any gears or bearings. These units can be supplied for a wide range of ratios with both a.c. and d.c. motors of various types.

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Diesel Engine Governor

Diesel engine governors which bring to the Diesel plant, whether isolated with single or multiple units, or operated in parallel on a large interconnected system, the reliability, sensitivity, stability, isochronality and flexibility of regulation not heretofore available are announced by the Woodward Governor Company, Rockford, Ill. The governor consists principally of control unit, power unit and oil pressure unit. The control unit consists of a sensitive governor head, positively driven from the engine shaft, the function of which is to indicate to the power mechanism the instant of and magnitude of every change in engine speed. The power unit consists of a pilot valve, servomotor and mechanical linkage.

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SWITCHBOARD INSTRUMENTS embodying the usual characteristics of performance, compactness and appearance are announced by the Westinghouse Electric & Manufacturing Company. They are rectangular flush mounted and supplied with illumination. The mounting details are worked out to permit mounting the instruments in close grouping on 4-in.-vertical center lines. The instruments are available in volts, amperes, watts, power factor, frequency, reactive-volt-amperes and radio-frequency-amperes.

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TO DEFROST ELECTRIC REFRIGERATORS automatically by turning off the electric power for a short time each night is made possible by the "De-Frost-O'Clock," which has been announced by the Bryant Electric Company, Bridgeport, Conn. Installation is accomplished by simply plugging the refrigerator into a special plug furnished with the clock.

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AN IMPROVED LINE of "Mazda" projection lamps has been announced by the General Electric Company. The results make possible, for the several classes of projectors, screen illuminations which average nearly twice as high as those available two years ago, it is claimed. The improved line meets the expanding requirements of picture projection by providing lamps adapted, both in characteristics and cost to the needs of diversified services and types of projector.